19

TRAFFIC OF
THE NEW YORK—PHILADELPHIA CANAL

REPORT

OF THE

COMMITTEE ON TRAFFIC

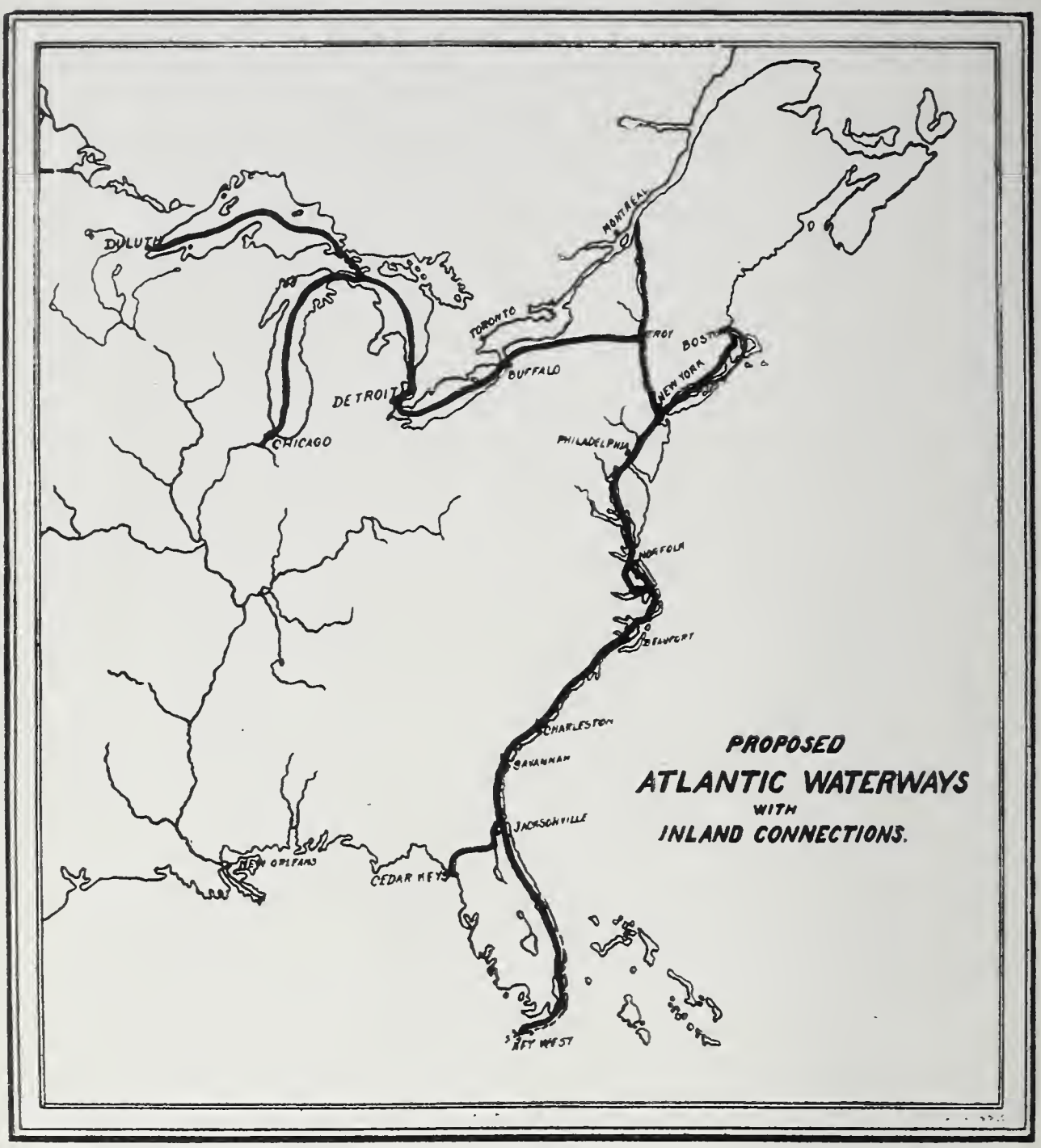
OF THE

PROPOSED

INTRA-COASTAL CANAL

CONNECTING

NEW YORK AND DELAWARE BAYS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PROPOSED
ATLANTIC WATERWAYS
WITH
INLAND CONNECTIONS.

REPORT

OF THE

COMMITTEE ON TRAFFIC

OF THE

Proposed Intra-Coastal Canal

CONNECTING

New York and Delaware Bays

COMMITTEE

EMORY R. JOHNSON, *Chairman*
WILFRED H. SCHOFF, *Secretary*
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Assisted by G. G. HUEBNER

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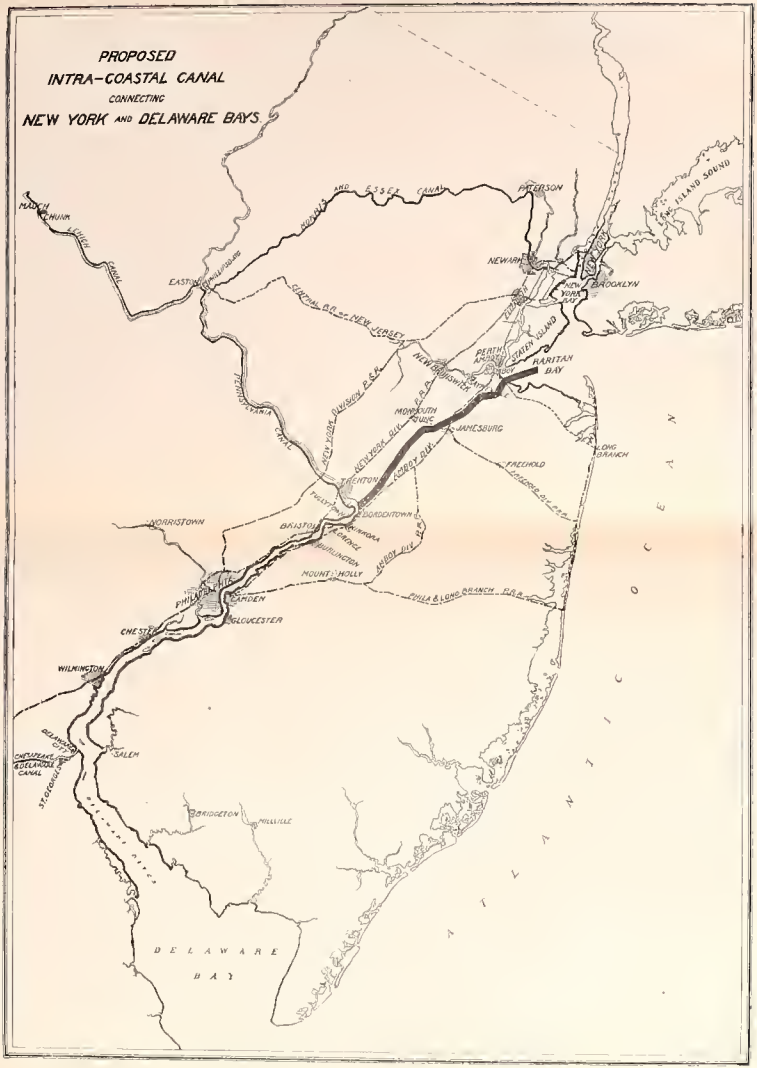
PROPOSED
INTRA-COASTAL CANAL
CONNECTING
NEW YORK AND DELAWARE BAYS
PATERSON
NEWARK
BROOKLYN
NEW YORK
LONG ISLAND SOUND
RARITAN BAY
PERTH AMBOY
STATEN ISLAND
JAMESBURG
LONG BRANCH
FREEHOLD
TRENTON
BORDENTOWN
MORRISTOWN
BRISTOL
BURLINGTON
MOUNT HOLLY
PHILADELPHIA
CAMDEN
GLOUCESTER
CHESTER
WILMINGTON
SALEM
BRIDGETON
MILLVILLE
DELAWARE BAY
ATLANTIC OCEAN

REPORT OF THE COMMITTEE ON TRAFFIC OF THE PROPOSED INTRA-COASTAL CANAL CONNECTING NEW YORK AND DELAWARE BAYS

The Committee on the Traffic of the Proposed Intra-Coastal Canal connecting New York and Delaware Bays, appointed in November, 1910, by the President of the Atlantic Deeper Waterways Association at the request of a Citizens' Committee of Sixty, consisting of men from New York, New Jersey, Pennsylvania and Delaware, submits the following report:

Scope of Inquiry and Sources of Information.

A detailed investigation of the available statistical and other sources of information has been made by the Committee, with the aid of expert assistance. Ten thousand circular letters were sent out, chiefly to manufacturers and shippers along the Atlantic seaboard, asking what use they would make of the proposed canal and how it would affect their business. Interviews were had with coastwise carriers (steam, sail and barge), the traffic officers of the Pennsylvania Railroad and the Philadelphia and Reading Railway, and with many individuals having knowledge that might be of assistance to the Committee.

The Board of Trade of Newark, New Jersey, and the Chambers of Commerce in Trenton, New Jersey, and Richmond, Virginia, sent the Committee valuable special reports upon the probable commercial influence of the proposed waterway.

The following sections of this report present in detail the statistics of the commence and the industrial activities that would be directly and indirectly served by the Philadelphia-New York link of the chain of intra-coastal waterway. The tables of statistics herewith presented are compiled from numerous sources, but mainly from (1) the report made by the U. S. Bureau of the Census in 1906 upon "Transportation by Water," (2) the statistics on coastwise traffic contained in the 1906 and 1909 reports of the Corps of Engineers of the U. S. Army, (3) the latest annual reports of the U. S. Department of Agriculture, (4) of the U. S. Geological Survey, (5) of the U. S. Commissioner of Navigation, and (6) of the Interstate Commerce Commission.

Attention may also be given to the report upon "Transportation by Water," issued by the U. S. Bureau of Corporations in 1910.

Volume and Value of Traffic Within the Section Affected by the Proposed Canal.

According to the report of the Bureau of the Census, the cargo tonnage handled coastwise within the district between the ports of Bangor, Maine, and Newbern, North Carolina, amounted to 76,000,000 tons in 1906. The reports compiled by the U. S. Army Engineers for 1909 make the total coastwise traffic within the same territory 143,000,000 tons. Which of these totals is more nearly correct the Committee has no means of knowing. The Census figures, while much smaller than those compiled by the Army Engineers, show a large volume of coastwise traffic along the Atlantic seaboard.

The total rail traffic (including traffic received from connecting roads) in the New England States, New York, Pennsylvania, New Jersey, Delaware, Maryland, Virginia, West Virginia, North Carolina and South Carolina, amounted in 1909 to 574,000,000 tons; and of this approximately 325,000,000 tons originated along the rail lines in these states.

The Committee has not been able to ascertain the tonnage of rail traffic moving between New York and Philadelphia. The figures supplied by the railways were only partial. It is believed that the rail traffic between the North Atlantic ports is less than the tonnage moving by water between these points.

The annual reports of the Pennsylvania Railroad and the Philadelphia and Reading Railway show a total rail tonnage, in 1909, for the entire New Jersey division of the former railroad and for the Central Railroad of New Jersey, of approximately 54,000,000 tons; but of this only a relatively small share moves between the ports of New York and Philadelphia. The major portion moves between interior points, and between interior points and the ports of New York and Philadelphia.

The district to be affected by the proposed waterway is one of great industrial importance. According to the census of 1905, the manufacturing districts of the seaboard states from Maine to North Carolina, inclusive, annually use raw materials valued at $4,332,000,000, and have an output valued at $7,671,000,000. At the leading ports from Bangor, Maine, to Newbern, North Carolina, inclusive, raw materials to the amount of $1,824,084,000 are annually used by the manufacturing industries, and a finished product amounting to $3,306,911,000 is produced. According to the

U. S. Geological Survey, a mineral production valued at $591,000,000 was produced in 1908 in the seaboard states from Maine to North Carolina, inclusive. The census of 1905 reports an annual lumber output valued at $116,000,000 in these states, and the total for these and the seaboard and Gulf states south of North Carolina, all of which make Northern shipments, was valued at $255,000,000. The U. S. Department of Agriculture reports that the agricultural products within the seaboard states from Maine to North Carolina, inclusive, amounted, in 1909, to $688,000,000, and this does not include truck farming and dairy products, which are items of rapidly increasing value within this territory.

Declining Use of Sailing Vessels and the Increasing Use of Barges in Coastwise Commerce.

The use of sailing vessels in the coastwise traffic of the United States is steadily and rapidly declining. The total tonnage of shipping on the Atlantic and Gulf coasts increased from 2,650,000 tons in 1889 to 4,850,000 tons in 1906; but the gain was in steamships and barges or unrigged craft operated principally by transportation companies, which in turn are largely owned by railroad lines; while the tonnage of independent sailing vessels available for all kinds of commerce decreased during the same period 160,287 tons. The storms of every winter levy their toll upon sailing vessel tonnage, and the loss is not made up.

The sailing fleet is being replaced, for the most part, as the needs of established lines require, by steamers and steam-towed barges. The Bureau of the Census reported in 1906 a total tonnage of unrigged craft on the Atlantic and Gulf coasts of 2,260,000, which tonnage exceeded that of freight and passenger steamships by 1,214,811, and was 1,154,721 tons greater than the sailing tonnage. The unrigged craft comprised 46½ per cent. of the total tonnage employed on the Atlantic and Gulf seaboards.

The reasons accounting for the substitution of barges for sailing vessels are indicated by the experience of one company transporting coal between Philadelphia and New England ports. The sailing vessels formerly used by this company in this service had an average capacity of 1200 tons burden, and the fleet employed could deliver, by making 500 voyages, about 600,000 tons per annum. The barges now employed have a capacity of 1600 to 3000 tons each and are operated in tows. By making 300 voyages and by dispatching 1150 barge loads, the company is now able to transport 2,400,000 tons per annum.

Barges are equally well adapted to the lumber traffic, and it is probable that they will be used in the future for

the transportation of the greater part of bulky coastwise freight. Barges have certain advantages over sailing vessels as carriers of bulk cargo and for some kinds of traffic over steamships, because of their smaller initial cost of construction, the more continuous and effective use that may be made of their motive power, and of their movement in fleets, with a consequent reduction in the number of crew required to operate the craft. Barges will have a further advantage over sailing vessels in case a large capacity intracoastal canal is opened, because the barges can be operated through such a waterway with the regularity of steamship traffic.

Freight Rates by the Proposed Canal.

The evidence prepared for the Committee indicates that the proposed waterway would result in a large saving in freight rates. Present barge rates—via the outside route north from Philadelphia and the outside and inside routes south therefrom—on bulky freight carried between the ports of the Atlantic and Gulf seaboards are much lower than corresponding railroad rates. The followng comparative rail and barge rates are representative and emphasize the marked difference in existing charges. This difference would be still greater in case the proposed canal were constructed, because larger barges could be used for inland traffic, because of the absence of canal tolls, and because of the reduced cost of marine insurance.

Comparative Rail and Barge Rates.

COMMODITY	ORIGIN AND DESTINATION	BARGE RATE[1]	EQUIVALENT RAILROAD RATE	ACTUAL RAILROAD RATE
Lumber	Norfolk to Philadelphia	$2 per m ft.	$3.15 per m ft.	$1.80 per 2000 lb.
Sand	Philadelphia to New York	.85 to $1.00 per ton	1.60 per ton	1.60 per 2000 "
Railroad Ties ..	Norfolk to Philadelphia	.11 to .12 per tie	.15¾ per tie	.09 per 100 "
Pig Iron	do	.95 to $1.00 per ton	1.95 per ton	1.95 per 2240 "
Pulp Wood	do	$1.80 per cord	3.85 per cord	2.20 per 2000 "
Fertilizer	Philadelphia to Norfolk	$1.00 to $1.25 per ton	1.60 per ton	1.60 per 2000 "
Coke	Philadelphia to Baltimore	.60 per ton	1.20 per ton	1.20 per 2000 "
Cinders	do to New York	.85 to $1.00 per ton	1.90 per ton	1.90 per 2000 "
Clay	do to do	.85 to $1.00 per ton	1.85 per ton	1.85 per ton
Coal[2] Anthracite.....	Philadelphia to Boston	.65 to .75 per ton	2.65 per ton	2.65 per ton
Coal[2] Anthracite.....	Philadelphia to Providence	55 to .60 per ton	2.70 per ton	2.70 per ton

[1] Barge rates between Philadelphia and eastern points via outside route; between Philadelphia and southern points via inside route.
[2] Railroad coal rate from Shamokin, Schuylkill District.

It is estimated that a 1000-ton barge, loading 75 per cent. capacity cargo (750 tons), can be profitably operated through the proposed free ship waterway across the State of New Jersey between Philadelphia and New York, at an average rate of freight of 45 cents per ton of 2000 lbs. (See Exhibit A, Appendix C.)

In like manner, a 2,000-ton barge, loading 60 per cent. capacity cargo (1200 tons), could be operated at an average freight rate of 35 cents per ton of 2000 lbs. (See Exhibit B, Appendix C.)

Terminal charges are not embraced in the above freight rates.

It is estimated that availing of the most modern, comprehensive, up-to-date loading and discharging facilities, 25 cents per ton of 2000 lbs. would cover the handling of cargo into and out of barges, divided 10 cents per ton for loading and 15 cents per ton for discharging. This would make the total transportation charges payable by the shipper 60 to 70 cents per ton.

Barges operated as above, it is estimated, would net their owners respectively 23 2/10 per cent. and 20 8/10 per cent. per annum upon the capital invested.

The principal saving to the shipper using the proposed canal would be on freight which can be delivered direct at industrial wharves or which, if shipped by rail, would require cartage. In the former case the cartage charge is eliminated, and in the latter it would be no less than on freight hauled to and from the water-front. At present barge rates and cartage charges, barge transportation, in most instances, affords little if any saving to the shippers who have private rail sidings. However, it is estimated that barge rates through the proposed canal will be lower than existing rates by water. There is a large amount of freight at the present time that is not handled over private railway sidings, as is shown by the large cartage business at the ports and much that is handled to and from industrial wharves.

Probable Traffic Through the Proposed Canal.

The traffic using the proposed canal will consist largely of coal, lumber of all kinds, building materials, iron and steel, petroleum, pottery, textiles, leather, tobacco, hardware, machinery, fertilizers, cotton, phosphate, naval stores, fruit, vegetables and other farm and garden products, and general merchandise or package freight.

A careful study of the existing sources of traffic indicates that there would be shipped per annum through the canal, during the early years of its operation, at least

1,250,000	tons of freight other than coal and lumber
3,400,000	tons of coal
550,000	tons of lumber
5,200,000	tons total.

This is probably an unduly conservative estimate. The tonnage assumed for coal is only 20 per cent. of the shipments by water in 1910 from the ports Norfolk to Philadelphia, inclusive. The lumber tonnage taken is 50 per cent. of the receipts by water of Southern pine at New York and Boston. No allowance is made for Southern lumber that will be shipped through the proposed canal to cities between Trenton and New York.

The use made of any canal will depend upon the existence of adequate terminal facilities. Fortunately, the harbor facilities now existing, or provided for by plans under consideration by the cities of New York, Newark, Trenton and Philadelphia, indicate that the canal will not be hampered by inadequate arrangements for receiving, handling and discharging cargo at the ports.

Probable Effects of the Proposed Canal upon Railway and Coastwise Traffic and upon Industrial Development.

While the cost of transportation through the proposed canal and the rates charged those who ship by that waterway will be considerably less than present railway freight rates, it is not probable that the canal will seriously interfere with the traffic or the profits of the railways. The canal will undoubtedly develop new traffic as the result of the industrial development of the territory served, and also as a medium for reaching distant points; and the consequences will be favorable to the railroads as well as to the shipping and commercial interests within the zone of the canal's influence. The addition of a waterway to existing railway facilities seldom, if ever, decreases the total traffic handled by the railroads; instead, as experience has shown, it tends to create traffic for the railroads, and particularly traffic in those classes of goods from which the railroads derive the highest freight rate profits.

It is the opinion of the Committee that a canal connecting Delaware and New York Bays and capable of accommodating barges of 1000 to 3000 tons burden would be actively used by companies now operating barges by the outside route between Philadelphia and New England points. An ideal route for such barges between Chesapeake Bay and Boston would be afforded by an enlarged Chesapeake and Delaware Canal, the proposed waterway between the Delaware and New York Bays, and canals connecting Long Island Sound with the port of Boston. An inside waterway between North Carolina and New England would increase the volume of coastwise commerce, and, what is hardly less important, would minimize the losses of property and human lives caused by shipwrecks. This safe inside route would be used by a type of craft that can be

operated with economy and with certain profit to the owners. One of the strongest arguments in favor of an inside route is the fact that in the single decade from 1900 to 1909 there were over 5700 disasters to shipping on our Atlantic seaboard. Not all losses are reported, but these accidents are known to have destroyed $40,500,000 worth of vessels and cargo, and to have caused the loss of over 2200 human lives.

In the following sections of this report a careful analysis is made of the industrial effects that would be produced by the construction of the proposed canal. The development resulting from this waterway will be similar to that which followed the opening of the Erie Canal at the beginning of the second quarter of the last century. It is believed by the people of New York State that the enlargement of the Erie and Champlain Canals will again cause those waterways to enhance the industrial progress of the Empire State. The industrial influence actually exerted during the last two or three decades by the Finow Canal and the canalized River Main in Germany are illustrated by two maps which accompany this report. These maps show that there has been a large development of manufacturing industries along those waterways, neither one of which possesses an industrial location comparable with that of the proposed waterway between Philadelphia and New York.

General Conclusions.

The type of canal that should be constructed and the depth and width that should be given the waterway are questions to be largely determined by the Engineer Corps of the U. S. Army with reference to the requirements of commerce and of the navy. A sea-level canal would be preferable to one with locks, and the dimensions of the waterway should be at least as great as those of the enlarged Erie and Champlain Canals. For both commercial and naval reasons, greater dimensions would probably be advisable.

The Army Engineers estimate that the cost of a sea-level canal between New York and Philadelphia, with a bottom width of 125 feet and a depth of 18 feet, will be $35,250,000. This is less than the value of the property lost along the Atlantic seaboard by shipwrecks during the last ten years. This annual toll of lives and property still continues to be levied. Within a few months past three barges laden with coal and seventeen men were lost in a storm off the coast of Massachusetts.

A canal connecting the New York and Delaware Bays is a most important part of the Atlantic coastal waterway. The Philadelphia-New York Canal will undoubtedly benefit

the eastern part of the United States. The project merits the support of the National Government and of the States and municipalities most directly interested.

EMORY R. JOHNSON, *Chairman;*
WILFRED H. SCHOFF, *Secretary;*
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N. B. KELLY,
FRANK L. NEALL,
E. R. SHARWOOD,
H. F. STETSER,
J. HAMPTON MOORE, *ex-officio.*

Map G 19

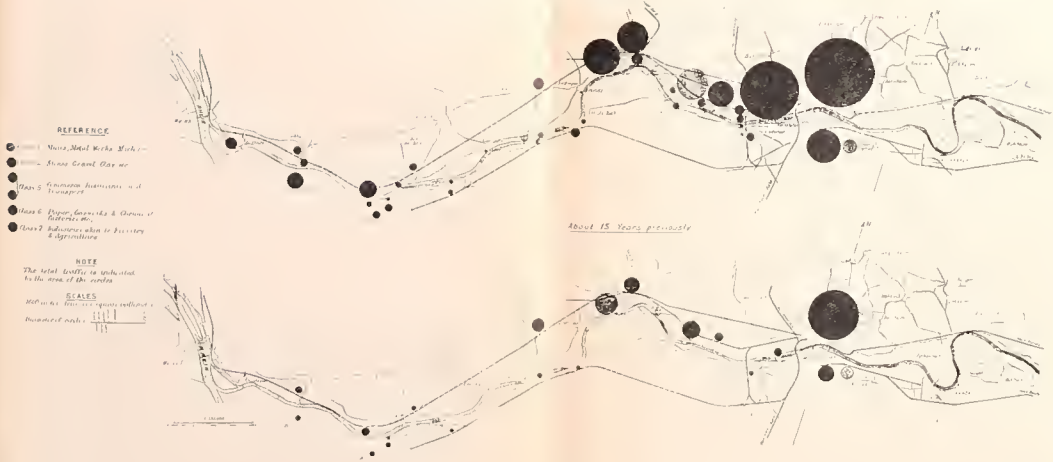
Report Reference page 24

ROYAL COMMISSION ON CANALS AND WATERWAYS.

FOREIGN ENQUIRY

THE INDUSTRIAL DEVELOPMENT ALONG THE CANALIZED MAIN FROM FRANKFURT TO MAINZ

Graphical representation of the total Traffic of the individual industries for the Year 1902


REFERENCE
Class 1 Metal Works Machines
Class 2 Stone Gravel Clay etc
Class 3 Chemical Industries and Tar Products
Class 6 Paper Leather Skins & Chemical Products etc.
Class 7 Industries which in Forestry & Agriculture
NOTE
The total traffic is indicated by the area of the circles
SCALES
About 15 Years previously

1. APPROXIMATE AMOUNT OF WATER TRAFFIC OF NORTH ATLANTIC SEABOARD

It is impossible to state precisely the volume of coastwise trade between ports adjacent to the proposed canal, because coastwise vessels are not required to enter and clear at the Custom House, or to report their cargo tonnage. The available figures, however, show that the coastwise shipments of the North Atlantic are of large volume. The United States Census of 1906 shows that the total shipments from the leading ports extending from Bangor, Me., to Newbern, N. C., aggregated 33,263,000 tons of freight. The total receipts at the same ports amounted to 42,704,000 tons. The commodities specified by the Census are coal, cement, brick and lime, lumber, stone, sand and gravel, petroleum and other oils, fruits and vegetables, ice, phosphate and fertilizers, pig iron and steel rails, grain, naval stores, canned goods, flour, cotton, iron ore, tobacco, and general merchandise. The shipments and receipts at each of twenty-three adjacent ports are shown in the accompanying table. (Table I.)

TABLE I

RECEIPTS AND SHIPMENTS OF LEADING PORTS ADJACENT TO THE PROPOSED CANAL

(Bureau of the Census, 1906.)

Port	Shipments	Net Tons Receipts	Total
New York	8,598,374	17,507,906	26,106,280
Philadelphia	5,213,485	2,721,456	7,934,941
Baltimore	3,579,407	1,858,443	5,437,850
Boston	887,001	6,533,573	7,420,574
Norfolk & Newport News	7,680,230	2,808,346	10,488,576
Providence	341,524	2,749,511	3,091,035
New Haven	161,666	2,156,814	2,318,480
Fall River	274,646	786,392	1,061,038
Washington	92,910	599,177	692,087
Portsmouth	25,390	362,820	388,210
Wilmington,Del.	95,241	250,188	345,429
Jersey City	186,982	167,548	354,530
New Bedford	163,951	581,176	745,127
Hoboken	552,348	43,774	596,122
Newark	5,318	315,681	320,999
Perth Amboy	1,463,185	398,883	1,862,068
South Amboy	2,845,014	3,950	2,848,964
New London	240,305	887,404	1,127,709
Bangor	255,613	319,546	575,159
Portland	303,295	1,357,316	1,660,611
Rockland	175,904	149,496	325,400
Wilmington, N. C.	121,930	145,209	267,139
Total	33,263,719	42,704,609	75,968,328

TABLE II.

TOTAL RECEIPTS AND SHIPMENTS OF DOMESTIC COMMERCE AS REPORTED BY UNITED STATES ENGINEERS.

Ports	Tons in 1909	Tons in 1906
Anacostia River	450,213	335,000
Arthur Kill	9,504,090	16,574,840
Baltimore	8,415,220 (3)	8,277,098
Beverly	196,203	138,862
Boston Harbor	24,478,668 (1)	18,549,230
Beaufort	52,396	10,465
Bridgeport	1,117,131	951,244
Cape Charles City, Va	2,355,984	1,723,635
Conn. River (below Hartford)	614,780	440,024
Elizabeth River, Va	1,861,402	4,225,179
Greenwich Harbor	79,727	108,348
Gloucester	218,165	275,888
Havre De Grace	"Asked for but not obtained."	73,815
Housatonic River	81,485	54,496
Hyannis	8,832	20,100
Lynn	359,195	343,784
Mispillion River, Del	187,356	258,704
Nansemond River, Va	96,251	91,063
Nantucket	28,550	20,100
New Bedford	1,392,802	899,632
New Haven	2,019,198	1,847,633
Newburyport	212,029	169,975
New London	707,768	697,139
Newport News	7,268,585	5,564,086
Newport Harbor	239,923	1,920,380
Newtown Creek	5,113,628	2,803,380
New York	25,509,733 (2)	16,921,976
Norfolk	10,972,999	15,600,000
Norwalk Harbor	222,787	251,759
Passaic River	2,650,809	2,577,188
Pawtucket River	475,255	287,739
Philadelphia	19,402,199	20,577,117
Portland, Me	2,956,011	2,546,625
Providence	3,814,982	3,086,003
Raritan Bay	5,333,676	6,432,245
Rappahannock River	397,210	364,000
Richmond & James River Point	476,465	527,818
Roanoke River, N. C	68,113	88,508
Sakonnet Harbor	7,385	not available
Stamford Harbor	264,615	249,175
St. Jones River, Del	113,550	55,196
Smyrna River	203,580	207,021
Taunton River	126,509	193,100
Thames River	497,725	427,503
Woods Hole, Mass	43,032	27,875
Washington	1,430,788	907,000
Wilmington, Del	805,447	1,016,696
Wilmington, N. C	872,426	814,291
Total	143,704,877	139,532,935

(See notes on next page.)

NOTES.—(1) Boston: Vessel tonnage. Cargo tonnage data not given.

(2) New York figures include only outlying bays and rivers, omitting Hudson and East Rivers, where most of the traffic is located. The items included are not the same for 1906 and 1909 and neither total can be compared with that given by the Census.

(3) Baltimore: Vessel tonnage.

The census statistics of coastwise cargoes are in some respects too low and do not include a sufficient number of ports. For these reasons, Table II was compiled from the returns of the U. S. War Department, for ports extending from Bangor to Newbern. It indicates an approximate total at 48 points for the year 1909 of 143 million tons, and in 1906, the census year, of 139 million tons. These aggregates comprise both shipments and receipts. The reports of the Engineer Corps include only those waterways for the improvement of which appropriations have been made by Congress. They include, however, numerous places not counted as ports in the Census and the basis of tabulation is not the same; so that the two totals cannot strictly be compared.

Coastwise shipments of coal and lumber are further indicated in the reports of the U. S. Bureau of Statistics. From the following table (Table III) it is seen that in 1910 approximately 17,290,147 tons

TABLE III.

SHIPMENTS OF COAL BY WATER

Port	Anthracite	Bituminous	Total
New York.....	15,036,622	11,289,095	26,325,717
Philadelphia	1,980,830	4,700,174	6,681,004
Baltimore	272,695	3,780,120	4,052,815
Norfolk	.....	3,534,134	3,534,134
Newport News.....	.....	2,817,120	2,817,701
Total	17,290,147	26,121,224	43,411,371

of anthracite and 26,121,224 tons of bituminous coal, a total of 43,411,371 tons were shipped by water from the five leading ports—New York, Philadelphia, Baltimore, Norfolk and Newport News. These figures include coal for the use of vessels in the domestic trade, and therefore differ widely from those of the Bureau of the Census. Shipments from New York include those from adjacent ports on New York Bay. New England ports are particularly heavy receivers of this coal, the Boston Chamber of Commerce reporting that in 1909 Boston alone received 1,668,126 tons of anthracite and 3,393,423 tons of bituminous coal by sea. The U. S. Bureau of Corporations estimated that New England ports received 16,752,053 tons of coal by water in 1905, and 14,236,920 tons in 1906.

The 4,256,000 tons of lumber which the Bureau of the Census reports as having been shipped from and received at ports tributary to the proposed canal may be supplemented with the data of the Bureau of Statistics. This Bureau reports that in 1909, 133,146,700 feet of southern lumber were received at Boston by water, and 486,660,800 feet of southern pine at New York. It reports that 68,186,000 feet of pine were shipped from the ports of Virginia and the Carolinas immediately south of the proposed canal; and in 1907 these shipments aggregated 128,957,900 feet. The Board of Commissioners of Navigation report the annual coastwise lumber receipts of Philadelphia at 226,717,318 feet, and the Lumbermen's Exchange presents an even larger figure.

The Board of Commissioners of Navigation prepared for the use of the committee an itemized statement of the tonnage of the port of Philadelphia for the year ending December 31, 1910. These statistics do not permit the computation of a total, but are of interest in that they indicate particular items. The following table (Table IV) shows the principal cargoes landed by vessels other than regular line steamers.

TABLE IV.

	Receipts via Delaware and Raritan and Chesapeake and Delaware Canals		Receipts via Delaware Capes		Total
Items	Amount	Equivalent in Tons	Amount	Equivalent in Tons	Equivalent in Tons
Lumber	121,005.483 feet	211,758	105,781,835 feet	184,996	396,754
R. R. Ties	885.354	64,151	1,701,861	127,639	191,790
Sand	10,401 tons	10,401	(1)	.....	10.401
Bricks	460,000	1,035	460,000	1,035	2,070
Pig Iron	49,099 tons	49,099	(1)		49,099
Mine Props	60,555 tons	60,555	(1)		60,555
Salt	49,000 bu.	1,715	(1)		1,715
Pulpwood	19,752 c'rds	34,566	(1)		34.566
Cinders	10,055 tons	10,055	3,697 tons	3,697	13,752
Oak Staves	50,000	89	(1)		89
Piling	1,075 tons	1,075	(1)		1,075
Chestnut Poles	52,000	.....	(1)		(2)
Logs	2,416	.....	(1)		(2)
Scrap Iron	1,300 tons	1,300	4,800 tons	4,800	6,100
Wood Blocks	1.150 tons	1,150	(1)		1.150
Phosphate Rock	563 tons	563	14,219	14,219	14,782
Shingles	.....	.....	3,600,000	1,620	1,620
Oil	.....	.....	3,099,981 bbls	619,996	619,996
Stone	.....	.....	21,350 tons	21,350	21,350
Asphaltum	.....	.....	20,700 bbls	3,105	3,105
Coal Tar	.....	.....	38,000 bbls	5,700	5,700
Sulphur	.....	.....	5,800 tons	5,800	5,800
Plaster	.....	.....	5,825 tons	5,825	5,825
Feldspar	.....	.....	3,080	3,080	3,080

(1) Amounts not stated.
(2) Weight not known.

The coastwise tonnage, receipts and shipments of Philadelphia in regular line steamers are estimated as shown in Table V.

TABLE V.

Water Traffic Tonnage, Estimated, Port of Philadelphia.

	Tons.
Norfolk	200,000
Savannah	400,000
Boston	450,000
Providence & Fall River	200,000
Baltimore, via canal	400,000
New York and outside route	750,000
Charleston & Jacksonville	150,000
Tampa	50,000
New Orleans	70,000
Total	2,675,000

Within the Delaware Capes.

	Tons.
Upper Delaware	100,000
Wilmington, Wilson Line	70,000
Bush Line	70,000
Chester Freight Line	100,000
Salem and Philadelphia Navigation Co.	15,000

TABLE V.—Continued.

City of Salem	40,000
Smyrna	12,000
Roeblings	50,000
Van Sciver	20,000
Odessa	10,000
Lebanon	10,000
Atlantic City	10,000
Milford	10,000
Frederica	10,000
Pennsgrove	20,000
Total	547,000
Grand Total	3,222,000

TABLE VI.

Coal Shipments of Philadelphia to Coastwise Ports, 1909 and 1910.

The coal shipments of Philadelphia to coastwise ports in 1909 and 1910 are stated by the Board of Commissioners of Navigation as follows:—

Items (per tons)	Coastwise Ports		Within Delaware Capes		Total	
	1910	1909	1910	1909	1910	1909
Total Anthracite	1,192,163	1,292,667	513,875	473,749	1,706,038	1,766,416
Total Bituminous	1,661,369	1,638,201	966,144	1,889,010	2,627,513	3,527,211
Grand Total	2,853,532	2,930,868	1,480,019	2,362,759	4,333,558	5,293,627

It is also reported that in 1910 362,196,361 gallons of oil were shipped from Point Breeze and Marcus Hook.

The amount of coastwise traffic is further indicated by the number and tonnage of the vessels in which it is carried. Table VII.

TABLE VII.

All Vessels and Craft of the Atlantic and Gulf Coasts, 1906.

Class	Number of Vessels	Gross Tonnage	Value of Vessels
Freight and passenger (steam)	1,523	1,045,811	$121,136,485
Freight and passenger (sail)[1]	4,227	1,105,901	33,213,849
Unrigged craft	8,699	2,260,622	41,658,685
Tugs and towing vessels	1,690	148,992	25,894,551
Ferryboats	270	162,834	19,970,466
Yachts (steam)	1,577	70,461	21,290,339
Yachts (sail)	1,358	21,046	3,775,743
All other	888	35,754	6,165,797
Total[1]	20,032	4,851,421	$273,105,915
Schooner barges	389	323,618	7,497,833

[1]Including schooner barges.

compiled from the report of the Bureau of the Census, shows that in 1906 there were 20,032 vessels, documented and undocumented, with a gross tonnage of 4,851,421 tons, engaged in carrying freight and passengers to and from the ports of the Atlantic and Gulf coasts. The capital invested in them aggregated over $273,000,000. As compared with the vessel situation of 1889, as shown by the Bureau of the Census, the number of vessels increased from 12,238, or 63.7 per cent., gross tonnage from 2,658,455, or 82.5 per cent., and the value of the vessels from $116,042,062, or 135.4 per cent.

The documented tonnage engaged in the trade of the Atlantic and Gulf coasts is annually reported by the United States Commissioner of Navigation. Table VIII, compiled from this report, shows a total of 17,203 vessels with a gross tonnage of 3,500,394 tons, and an increase of 95 per cent. in the tonnage since 1889.

TABLE VIII.

Enrolled and Licensed Vessels, Over 20 Tons, of Atlantic and Gulf Coasts.

Year	Total		Sail (1)		Steam	
	No.	Gross Tonnage	No.	Gross Tonnage	No.	Gross Tonnage
1909	17,203	3,500,394	11,108	1,841,101	6,095	1,659,293
1905	16,763	2,763,866	12,500	1,670,105	4,263	1,093,761
1900	15,742	2,190,552	12,516	1,323,958	3,226	866,594
1895	16,247	2,033,367	13,190	1,240,148	3,057	793,219
1890	16,214	1,917,041	13,504	1,226,208	2,710	690,833
1889	16,261	1,786,065	13,522	1,112,649	2,739	673,416

[1]Including barges and canal boats.

The reports of the Commissioner of Navigation further show that 15,966 vessels were, in 1909, documented at the ports adjacent to the proposed canal. 7,132 of these vessels were sailing ves-

TABLE IX.

Documented[1] Vessels of Ports Adjacent to Proposed Canal (1909).

Ports of	Sailin' vessels		Steam vessels		Canal boats		Total	
	No.	Tons	No.	Tons	No.	Tons	No.	Tons
Maine	1007	201,539	459	66,555	12	5,389	1,478	273,483
New Hampshire	12	1,648	9	588	13	1,341	34	3,577
Vermont	5	353	8	2,901	7	716	20	3,970
Massachusetts	750	215,996	503	116,394	23	8,161	1,276	340,551
Rhode Island	64	9,037	217	13,933	7	1,602	288	24,572
Connecticut	253	55,557	347	84,885	151	45,154	751	185,596
New York	1033	278,846	2,299	1,326,328	3294	529,777	1,726	2,134,951
Pennsylvania	217	127,779	518	197,712	167	64,574	902	390,065
New Jersey	646	59,057	288	25,361	205	55,389	1,139	139,807
Delaware	95	13,282	50	20,678	14	4,955	159	38,915
Maryland	1441	72,906	303	123,570	111	28,670	1,855	225,146
District of Columbia	22	2,170	39	14,795	....	.....	61	16,965
Virginia	1115	28,211	394	26,762	34	13,690	1,543	68,663
North Carolina	472	7,248	245	7,576	17	1,091	734	15,915
Total	7132	1,073,629	9,679	2,028,038	3155	760,509	15,966	3,862,176

[1]Including registered tonnage.

sels, 5,679 steam vessels and 3,155 barges and canal boats, and their aggregate gross tonnage was 3,862,000 tons.

It is not feasible to tabulate the detailed vessel data for all ports of the North Atlantic, but those of New York and Philadelphia may be analyzed to show the nature of the vessels engaged in the coastwise trade. Table X shows that at the end of the fiscal year 1910 the enrolled and licensed fleet of the port of New York comprised 3,536 vessels with a gross tonnage of 1,266,246 tons, distributed among the various classes of vessels as follows:

TABLE X.

Documented Tonnage at New York. (June 30, 1910.)

Enrolled Vessels	Number	Gross Tons
Permanently enrolled sailing vessels (wood)	389	180,189
" " steam vessels (wood)	647	122,140
" " canal boats (wood)	44	6,558
" " barges (wood)	1499	411,910
" " sailing vessels (metal)	21	32,985
" " steam vessels (metal)	362	422,061
" " barges (metal)	32	15,874
Temporarily " sailing vessels (wood)	25	14,142
" " steam vessels (wood)	6	649
" " canal boats (wood)	1	113
" " barges (wood)	9	2,524
" " barges (steel)	3	936
" " steam vessels (metal)	9	28,888
Total	3,047	1,258,969
Licensed vessels, under 20 tons	489	7,277
Registered vessels (Foreign trade)	107	336,789
Grand Total [1]	3,643	1,603,035

[1]Excluding yachts and house boats.

The entire fleet comprises 536 sailing vessels with a gross tonnage of 246,270 tons; 1,500 steam vessels, gross tonnage 915,516; 45 canal boats, gross tonnage 6,671; and 1,562 barges with a gross tonnage of 434,578 tons. All but 81 of the sailing vessels have a gross tonnage of less than 1,000 tons each, and all but 5 less than 2,500 tons. All but 220 of the steam vessels have a gross tonnage of less than 1,000 tons each, and all but 121 are of less than 2,500 tons. Barges are not specified as to their size, but their average gross tonnage is 278 tons. It appears that the great majority of even the steam and sailing vessels documented at New York are not excluded from the proposed canal by their dimensions.

The itemized account of the fleet documented at Philadelphia is shown in Table XI.

TABLE XI.

Documented Tonnage of Philadelphia. (June 30, 1910.)

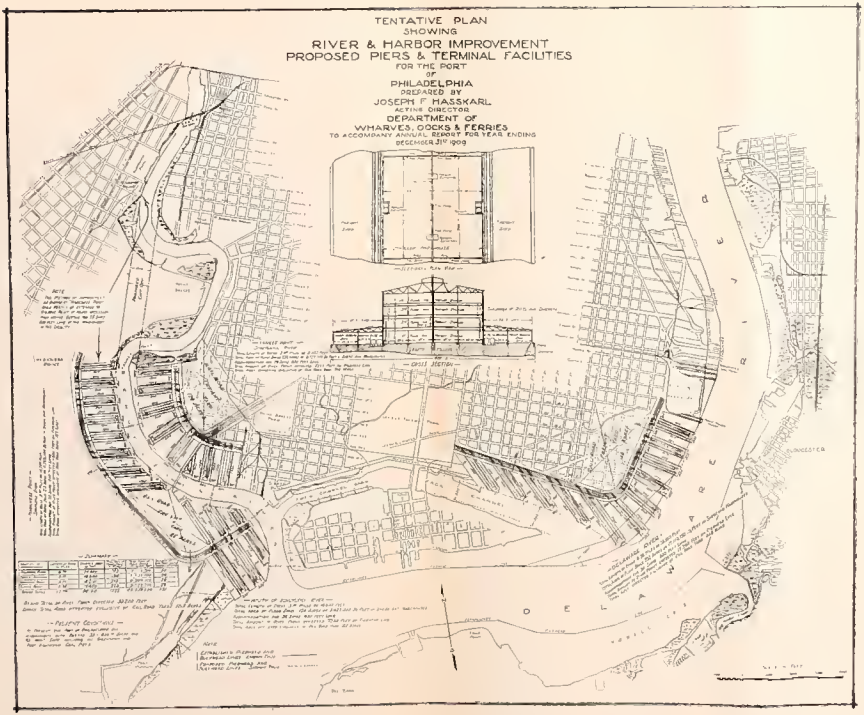
Enrolled Vessels	Number	Gross Tons
Permanently enrolled sailing vessels (wood)	148	100,973
" " steam vessels (wood)	89	11,659
" " barges (wood)	148	53,848
" " sailing vessels (metal)	6	4,788
" " steam vessels (metal)	115	63,456
" " barges (metal)	11	9,090
Temporarily " sailing vessels (wood)	9	5,306
" " steam vessels (wood)	1	83
" " barges (wood)	4	967
" " barges (metal)	2	561
" " sailing vessels (metal)	1	2,128
" " steam vessels (metal)	2	4,001
Total	536	256,860
Licensed vessels	104	2,001
Registered vessels (Foreign trade)	15	28,093
Grand Total [1]	655	286,954

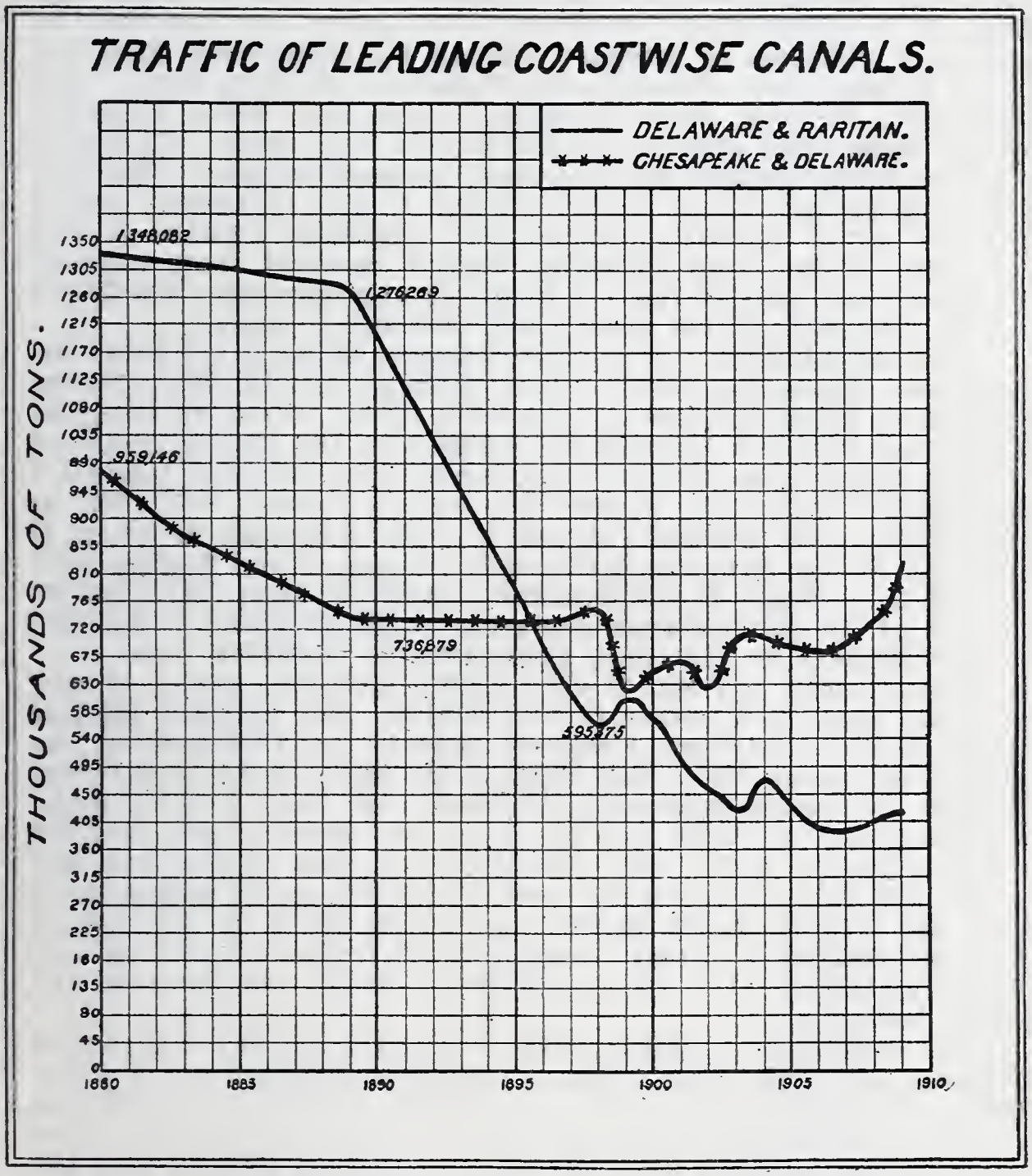
[1]Excluding yachts.

The fleet consists of 198 sailing vessels of 116,956 gross tonnage; 286 steam vessels of 104,313 tons; and 171 barges of 65,685 tons. The entire coastwise fleet comprises 640 vessels with a gross tonnage of 258,861 tons. All but 18 of the entire sailing fleet and all but 20 of the steam fleet have a gross tonnage of less than 1,000 tons each. None of the sailing vessels and but 6 of the steamers have a gross tonnage of 2,500 tons or over; and the average tonnage of the barge fleet is 384 tons.

It should be noted that the foregoing figures do not include undocumented tonnage. At the port of New York are many thousand lighters and floats used for harbor work. These craft are not enrolled. They would not be much used for canal traffic except to and from points located upon the canal near its termini; hence they need not be considered in this analysis.

The large coastwise traffic of the North Atlantic is at present dependent but slightly upon canals. The following chart graphically shows the decline in tonnage of the Delaware and Raritan from 1,348,000 tons in 1880 to 401,231 in 1909; and of the Chesapeake and Delaware from 959,146 tons in 1880 to 818,386 in 1909. Yet it is significant that in spite of the inadequate dimensions of these two canals they still handle 1,219,617 tons of freight annually. The traffic of the Delaware and Raritan consists mainly of coal, sand, brick and stone, iron, lumber, clay, oil, coke, and general merchandise; and that of the Chesapeake and Delaware chiefly of lumber, coal, sand and stone, railroad ties, iron, fertilizers and general merchandise. Though these waterways do not indicate the amount of freight which would pass through a large and improved canal, they show that certain quantities of bulky freight will seek even an inadequate inland waterway in preference to the more dangerous open sea route or the more expensive railroad transportation.


TENTATIVE PLAN
SHOWING
RIVER & HARBOR IMPROVEMENT
PROPOSED PIERS & TERMINAL FACILITIES
FOR THE PORT
OF
PHILADELPHIA
PREPARED BY
JOSEPH F. MASSKARL
ACTING DIRECTOR
DEPARTMENT OF
WHARVES, DOCKS & FERRIES
TO ACCOMPANY ANNUAL REPORT FOR YEAR ENDING
DECEMBER 31ST 1909
DELAWARE RIVER
CAMDEN
GLOUCESTER
DELAWARE BAY


TRAFFIC OF LEADING COASTWISE CANALS.
DELAWARE & RARITAN.
CHESAPEAKE & DELAWARE.
THOUSANDS OF TONS.
1350
1305
1260
1215
1170
1125
1080
1035
990
945
900
855
810
765
720
675
630
585
540
495
450
405
360
315
270
225
180
135
90
45
0
1348082
1276269
959146
736879
595275
1880
1885
1890
1895
1900
1905
1910

II. RAILROAD TRAFFIC BETWEEN POINTS ADJACENT TO THE PROPOSED WATERWAY

The rail carriers do not at present report their tonnage statistics in such a way as to show the movement between given points, and thus the rail traffic moving between places on the north and middle Atlantic coast cannot be accurately stated. The data of the Interstate Commerce Commission are classified by groups or divisions of territory. Group I includes New England; Group II, New York, Pennsylvania, Delaware and New Jersey; and Group IV, Virginia, West Virginia, North and South Carolina. Within these three districts the railways in 1909 carried 573,902,548 tons, including freight received from connecting lines. The tonnage originating within these districts is not separately stated. For the entire country, however the originated tonnage is 56.6 per cent. of the total including freight received from connecting lines; and, at this rate, it would be approximately 324,828,000 tons in the coast States from South Carolina to Maine.

The annual report of the Pennsylvania Railroad for 1909, furthermore, states the total freight tonnage of the New Jersey Division as 34,199,226 tons. The annual report of the Philadelphia & Reading does not separate the tonnage of the Central Railroad of New Jersey from that of the entire system, but the Interstate Commerce Commission reports its freight revenue for 1909 at $16,588,966. The average receipts per ton of freight in Group II are $.842, and at that rate the freight tonnage of the Central Railroad of New Jersey is approximately 19,702,000 tons. The annual tonnage of the two railways operating in the territory of the proposed waterway is, therefore, approximately 53,901,000 tons.

The greatest portion of this traffic, however, moves to and from the ports and points in the interior, and between interior points, and not between coastwise points. As is shown in the table on next page, the largest items in the traffic of the New Jersey Division of the Pennsylvania Railraod[1] are coal, lumber, stone and sand, cement, brick and lime, bar and sheet metal, castings and machinery, fruits and vegetables, pig and bloom iron and coke. The bulk of this traffic goes to the coastwise points direct from the interior, or is shipped to certain ports by rail and is there transhipped by water. Available rail traffic statistics do not, therefore, indicate the rail movement between the ports of the North Atlantic.

The statements furnished to the committee by the Pennsylvania Railroad and the Philadelphia & Reading Railway as to their traffic between Philadelphia and New York City do not lessen the dearth of statistics to any great extent. The data supplied by the Pennsylvania Railroad refer to certain specified articles, and the figures submitted by both railroads include only traffic originating at Philadelphia and New York City. The approximate total traffic reported upon by the two railroads—the classified freight of the Pennsylvania Railroad being estimated—amounts to about 247,000 tons. The special commodities which the Pennsylvania Railroad reported upon are grain, mill products, animal products, lumber, oils and petroleum products, sugar, castings and machinery, bar and sheet metal, cement, brick and lime. The Philadelphia & Reading Railway reported its Philadelphia-New York tonnage to consist almost entirely of classified freight.

TABLE XII.

Classification of Freight Traffic.

	New Jersey Division, Pennsylvania Railroad, excluding Delaware and Raritan Canal
	Tons.
Products of Agriculture—	
Grain	422,548
Flour	254,916
Other mill products	150,396
Hay	177,985
Tobacco	27,164
Cotton	65,070
Fruits and vegetables	790,456
Other articles	219,530
Products of Animals—	
Live stock	248,221
Dressed Meats	154,635
Other packing-house products	74,574
Poultry, game and fish	84,858
Wool	26,187
Hides and leather	132,795
Other articles	118,032
Products of Mines—	
Anthracite coal	5,245,714
Bituminous coal	11,891,601
Coke	596,824
Ores	127,366
Stone, sand and like articles	1,758,989
Other articles	254,248
Products of Forests—	
Lumber	2,028,832
Other articles	160,672
Manufactures—	
Petroleums and other oils	346,635
Sugar	214,476
Naval stores	26,258
Iron—pig and bloom	738,925
Iron and steel rails	203,129
Castings and machinery	825,502
Bar and sheet metal	927,616
Cement, brick and lime	1,156,801
Agricultural implements	23,466
Wagons, carriages, tools, etc.	117,387
Wines, liquors and beers	94,718
Household goods and furniture	39,306
Other articles	2,668,388
Merchandise	416,305
Miscellaneous	1,388,701
Total	34,199,226

It is estimated further that 85% of the rail shipments via New York and Philadelphia pass beyond these points to and from Southern and New England points. This would bring the total rail shipments between Philadelphia and New York City to approximately 1,632,000 tons. If the rail shipments between New Jersey points and Philadelphia and New York, and between New Jersey points reached by the proposed canal amount to two-thirds of the through shipments or aggregate one million tons, the grand total would be 2,632,000 tons.

These figures do not tally with the well-known volume of business. If they were a complete measure of the rail tonnage they would indicate that the two great railroads between the points reached by the proposed waterway handle a smaller traffic than is at present shipped by water.

III. PRODUCTION IN THE TERRITORY ADJACENT TO THE PROPOSED CANAL

The sections adjacent to the proposed waterway comprise the leading manufacturing districts of the United States. While not all of this production, nor even the major share of it, is available for shipment through the canal, the vast manufacturing industries nevertheless constitute one of the large sources of the traffic of the canal. Table XIII, compiled from the reports of the United States Bureau of the Census, shows that in 1905 there were in the aggregate 97,733 manufacturing establishments in the States adjacent to the proposed canal, having a total capitalization of $7,007,153,000, 3,025,000 wage earners, materials valued at $4,332,000,000, and finished products valued at $7,671,000,000.

TABLE XIII.

Total Manufactures, 1905.

State	Number of establishments	Capital (Thousands)	Wage earners	Cost of materials used (Thousands)	Value of products (Thousands)
New Jersey.....	7,010	$715,060	266,336	$470,449	$774,369
New York.....	37,194	2,031,460	856,947	1,348,603	2,488,346
Pennsylvania....	23,495	1,995,837	763,282	1,142,943	1,955,551
Maine.....	3,145	143,708	74,958	80,042	144,020
New Hampshire.	1,618	109,495	65,366	73,216	123,611
Vermont	1,699	62,659	33,106	32,430	63,084
Massachusetts...	10,723	965,949	488,399	626,410	1,124,092
Connecticut.	3,477	373,284	181,605	191,302	369,082
Rhode Island..	1,617	215,901	97,318	112,872	202,110
Delaware.	631	50,926	18,475	24,884	41,160
Maryland.....	3,852	201,878	94,174	150,024	243,376
North Carolina..	3,272	141,001	85,339	79,268	142,521
Total.....	97,733	$7,007,158	3,025,305	$4,332,443	$7,671,322

To narrow this vast production down to the seaboard districts exclusively, Table XIV was constructed. It shows that in the leading ports from Bangor, Me., to Newbern, N. C., there were 40,196 manufacturing establishments in 1905, with a total capital of $2,667,914,000; 1,151,146 wage earners, materials valued at $1,824,084,000, and finished products valued at $3,306,911,000.

TABLE XIV.

Total Manufactures of Leading Cities Influenced by Proposed Canal (1905).

City	Establishments	Capital (In thousands)	Wage earners	Cost of materials (In thousands)	Value of products (In thousands)
Baltimore	2,163	$148,764	65,224	$81,014	$151,547
Bangor, Me.	87	2,944	1,496	1,737	3,408
Bayonne, N. J.	58	50,297	7,057	46,984	60,634
Boston	2,747	131,563	59,160	94,603	184,351
Bridgeport, Conn.	306	49,381	19,492	22,335	44,587
Camden, N. J.	298	31,992	12,661	20,423	33,587
Chester, Pa.	131	22,070	7,061	10,422	16,645
Elizabeth, N. J.	124	23,564	12,335	16,982	29,301
Fall River	234	69,375	26,836	26,096	43,473
Harrison, N. J.	41	11,389	4,040	3,629	8,409
Hoboken	279	11,777	7,227	6,580	14,077
Jersey City	628	82,395	20,353	48,799	75,741
Lynn, Mass.	431	23,139	21,540	32,616	55,003
Newark, N. J.	1,600	119,026	50,697	80,689	150,055
New Bedford	176	40,410	17,855	16,091	29,469
Newbern, N. C.	21	1,233	762	675	1,343
New Brunswick	71	10,393	4,590	4,158	8,917
New Haven	490	31,413	21,437	18,521	39,666
New London	57	4,590	2,554	2,527	4,710
Newport News	25	22,958	7,406	4,479	9,054
New York	20,839	1,042,946	464,716	818,029	1,526,523
Norfolk	123	4,576	3,063	3,261	5,900
Passaic	95	28,611	11,000	13,110	22,783
Perth Amboy	53	11,583	3,950	30,316	34,800
Philadelphia	7,087	520,179	228,899	333,352	591,388
Plymouth	35	7,910	2,300	8,568	11,116
Portland, Me.	243	6,280	4,345	4,354	9,133
Portsmouth	27	2,631	638	888	2,602
Richmond	281	31,953	12,883	13,102	28,203
Rockland, Me.	50	2,382	949	951	1,823
Salem, Mass.	143	9,670	5,945	7,921	12,202
Stamford	62	7,526	3,341	2,330	5,890
Trenton	312	41,623	14,252	17,692	32,720
Washington, D. C.	482	20,200	6,299	7,732	18,359
West Hoboken	95	6,018	3,562	3,122	5,947
Wilmington, Del.	247	33,227	13,554	18,173	30,390
Wilmington, N. C.	55	1,926	1,667	1,823	3,155
Total	40,196	2,667,914	1,151,146	1,824,084	3,306,911

The value of the leading products manufactured in the States adjacent to the proposed canal is shown in Table XV. The iron and steel, glass, foundry and machine ship products, electrical machinery, chemicals, cars and shop construction, boots and shoes, leather, malt liquors, lumber and timber products, petroleum, pottery, terra-cotta and fire clay products, slaughtering and meat packing products, textiles, tobacco products, wire, brick and tile, clothing, flour and grist, furniture, sugar and molasses, paper and wood pulp, structural iron and lime and cement constitute an imposing array of manufactures, many of which are suitable for shipment through the proposed canal.

The region bordering the canal includes five of the greatest industrial districts of the United States—those of New York, Phila-

delphia, Boston, Baltimore and Providence. These districts include the main cities and also all others in their immediate vicinity, some of which are not ports and are therefore not included in Table XIV. As reported by the Bureau of the Census in 1905, they are among the thirteen leading manufacturing districts in the country, with a total capital of $2,843,748,451, and annual products valued at $3,638,482,807.

TABLE XV.

Leading Manufactures of Atlantic Seaboard States.

(In thousands of dollars.)

State	Boots and Shoes (Leather)	Cars and Shop Construction	Chemicals	Electric Machinery	Foundry and Machine Shop Products	Glass	Iron and Steel
New Jersey ..	6,977	6,899	13,024	13,803	41,540	6,450	23,667
Pennsylvania..	14,608	80,450	15,427	26,258	119,651	27,672	471,228
New York	34,137	22,137	29,090	35,348	115,876	4,029	29,862
Delaware	.....	5,158	.....	.....	3,432	.....	1,597
Maryland	1,011	5,752	1,082	225	9,172	704	12,230
Virginia	2,627	8,693	490	.....	2,768	549	4,859
Connecticut ...	1,280	2,155	.....	4,940	20,068	738	5,151
Rhode Island..	175	.....	.....	5,435	16,339	62	*908
Massachusetts	144,291	6,349	3,509	15,882	58,509	1,333	11,948
Maine	12,351	1,190	.....	.....	4,767	.....	.....
N. Hampshire.	22,426	1,600	.....	150	3,082	....	.....
Vermont	676	860	.....	.....	3,184	.....	.....
North Carolina	186	2,444	.....	.....	2465	.....	.....
Total	240,745	143,687	62,622	102,041	400,853	41,537	561,450

(*) Not made in rolling mills or steel works.

State	Leather	Malt Liquors	Lumber and Products	Flour and Grist	Furniture	Lime and Cement
New Jersey ..	21,495	17,466	7,254	5,469	1,404	3,173
Pennsylvania..	69,428	34,864	53,571	38,519	12,377	13,502
New York	21,643	61,958	54,090	54,546	28,111	3,766
Delaware . ..	10,251	760	687	1,537	.....	.....
Maryland	1,911	4,967	6,167	7,318	3,445	447
Virginia	5,830	1,201	17,265	13,832	803	1,317
Connecticut ...	875	2,927	4,590	1,982	557	296
Rhode Island..	349	2,740	1,318	1,134	45	.....
Massachusetts	33,353	11,081	12,636	4,618	11,093	401
Maine	2,500	.....	20,162	3,932	377	1,174
N. Hampshire.	1,774	2,255	9,007	2,542	846	....
Vermont	342	.....	8,969	3,206	1,533	266
North Carolina	2,662	.....	19,134	6,864	6,182	.....
Total.....	172,413	140,199	214,850	145,499	66,773	24,342

(Table XV concluded).

State	Paper and Wood Pulp	Structural Iron Work	Sugar and Molasses Refining	Fertilizers	Petroleum	Pottery, Terra Cotta and Fire Clay	Slaughtering and Meat Packing	Smelting and Refining Copper
New Jersey	5,043	4,365	.....	5,652	46,609	11,717	17,238	62,795
Pennsylvania	15,411	23,706	37,183	4,095	47,460	10,759	32,321	.....
New York	37,751	19,657	116,439	2,082	.....	3,289	73,218	5,179
Delaware	1,905	.....	.....	371	.....	.....	548	.....
Maryland	3,296	842	.....	6,632	†	852	6,701	.....
Virginia	3,034	625	.....	4,659	.....	77	1,996	.....
Connecticut	5,039	348	.....	943	.....	144	.....	106
Rhode Island	.....	147	.....	.....	.....	.....	2,499	.....
Massachusetts	32,012	2,692	.....	1,978	.....	718	37,099	.....
Maine	22,951	.....	.....	66	.....	.....	648	.....
New Hampshire	8,930	.....	.....	.....	.....	.....	.....	.....
Vermont	3,831	.....	149	.....	.....	.....	.....	.....
North Carolina	.....	.....	.....	3,099	.....	106	(&) 192	.....
Total	139,203	52,382	153,771	29,577	94,069	27,662	172,460	68,080

State	Textiles	Tobacco Manufacturers	Wire	Brick and Tile	Clothing	Grand Total by States
New Jersey	96,060	10,987	11,104	3,796	8,614	452,581
Pennsylvania	188,432	40,897	3,757	7,280	37,748	1,426,604
New York	123,668	65,597	13,039	7,430	340,716	1,302,678
Delaware	.....	161	.....	205	.....	26,612
Maryland	7,317	4,648	250	1,097	22,805	108,871
Virginia	7,842	16,768	.....	1,804	954	97,993
Connecticut	56,933	2,350	2,600	921	1,614	116,557
Rhode Island	103,096	358	208	.....	.....	134,813
Massachusetts	271,370	6,578	5,326	1,171	21,724	695,671
Maine	32,985	450	.....	420	1,097	105,071
New Hampshire	47,800	570	43	529	1,040	102,594
Vermont	7,775	127	.....	104	1,640	32,662
North Carolina	50,294	28,088	.....	696	1,401	123,813
Total	993,572	177,579	36,327	25,453	439,353	4,726,520

† Baltimore refineries not separately specified.
(&) Not including meat packing.

TABLE XVI.

Manufactures of Five Industrial Districts, 1905.

	Establishments	Capital	Wage-earners	Cost of materials	Value of products
Industrial district of New York City	25,257	$1,572,628,947	654,988	$1,209,010,634	$2,144,488,093
Philadelphia	7,780	622,081,779	261,456	387,566,027	677,781,117
Boston	4,870	311,088,956	160,481	249,836,524	457,254,360
Baltimore	2,243	166,770,882	71,432	124,600,047	202,659,272
Providence	1,237	171,177,887	73,391	86,568,340	156,299,965
Total of five districts	41,387	$2,843,748,451	1,221,748	$2,057,581,572	$3,638,482,807

Minerals constitute a second basis of traffic. Table XVII, compiled from the reports of the United States Geological Survey, contains an itemized account of the minerals produced in the region bordering on the proposed canal in 1908. They comprise an aggregate value of $591,424,000. Many of them, such as coal, clay products, lime, stone and slate, sand and gravel, glass sand, cement, pig iron and petroleum are especially adapted to water transportation.

TABLE XVII.

Value of Production of Minerals in Adjacent States, 1908. United States Geological Survey.

(In thousands of dollars.)

	Clay Products	Feldspar	Lime	Min. Waters	Slate	Stone	Ochre, etc.	Sand and Gravel	Talc and Soap Stone	Coal	Glass	Cement	Graphite	Gypsum	Iron Pig	Gas	Petroleum	Salt	Otcer Minerals	Total
Maine	$543	123	661	394	214	2,028	...	....	....	.....	...	....	..	..	.....	....	....	....	82	4,045
New Hampshire	372	...	...	260		867	...	...	....	.....	...	....	..	..	.....	....	....	....	116	1,615
Vermont	89	...	170	17	1,710	7,153	2	42	100	.....	..	....	..	..	.....	....	....	....	31	9,314
Massachusetts	1,647	...	566	228	....	2,955	...	90	...	A	25	A	..	..	.....	...	....	...	414	5,925
Rhode Island	....	..	....	39	....	556	..	...	....	.....	...	...	A	..	.....	...	....	....	....	595
Connecticut	.	66	308	36	....	1,126	..	8	....	.....	..	...	...	..	.....				1,177	2,721
New York	8,929	53	530	878	....	6,157	65	1,349	697	.....	4	2,255	116	761	15,879	959	2,072	2,137	2,829	45,670
New Jersey	12,314	...	135	126	....	1,532	...	666	....		46	2,416	..	.	3,370	.	....	...	711	21,316
Pennsylvania	14,843	104	1,884	197	3,903	6,371	192	1,719	..	276,995	484	13,987	17	.	111,385	19,105	16,881	...	5,016	473,083
Delaware	147	...		....	....	196	...	32	....	.....	...	....	..	..	.....	....	....	....	8	383
Maryland	1,441	52	293	76	103	968	..	390	....	5,117	14	A	..	..	.....	....	....	...	3,036	11,490
North Carolina	944	...	25	27	....	800	...	2	51		...	....	..	..	.....	....	...	....	292	2,141
Virginia	1,499	A	424	207	194	602	.	119	458	3,869	.	A	A	..	4,578	..	....	...	1,176	13,126
Total	42,768	398	4,996	2,485	6,124	31,311	259	4,417	1,306	285,981	573	18,658	133	761	135,212	20,064	18,953	2,137	14,888	591,424

"A"—Less than $1000.

Another classification of minerals, as made by the Bureau of the Census, is shown in Table XVIII. The States adjacent to the proposed canal were, in 1905, credited with 59,910 mines and quarries, employing 240,760 wage-earners, using materials valued at $43,073,000, and producing minerals valued at $289,734,000.

TABLE XVIII.

Summary of Mines and Quarries in Adjacent States (1905). United States Census.

State	Number of mines, etc.	Wage earners	Cost of materials	Value of product
Maine	135	3,684	$476,964	$3,656,134
New Hampshire	56	1,253	134,128	1,176,312
Vermont	192	5,398	1,076,143	5,904,705
Massachusetts	251	4,242	762,335	4,671,855
Rhode Island	22	667	85,127	774,611
Connecticut	90	1,497	236,075	1,425,959
New York	9,768	9,560	3,002,554	13,350,421
New Jersey	162	5,645	2,235,964	6,605,402
Pennsylvania	48,672	190,935	33,111,903	236,871,417
Delaware	12	504	45,361	448,467
Maryland	232	6,826	859,755	7,313,712
Virginia	192	8,993	928,387	6,607,807
North Carolina	126	1,556	118,782	927,376
Total	59,910	240,760	$43,073,478	$289,734,178

The *lumber industry* comprises a third traffic source. The returns of the Census office, summarized in Table XIX, show that in 1905 there were 6,428 establishments engaged in the lumber industry of the States from Maine to North Carolina, inclusive, employing 77,789 wage-earners, and $88,840,000 of capital. Materials valued at $39,738,000 were used annually, and their output was valued at $116,235,000. Much lumber, however, is shipped to North Atlantic ports from the States south of North Carolina. As shown in the table, there were 3,991 additional establishments in the lumber industry of these States, with an annual product valued at $138,508,000. The aggregate lumber output of all the States from which the canal may be expected to draw traffic was, in 1905, valued at $254,743,000.

TABLE XIX.

Lumber and Timber Products in Adjacent States (1905). United States Census.

State	Number of Establishments	Capital	Wage Earners	Cost of Materials	Value of Product
Maine.....	752	$15,083,395	12,028	$7,084,131	$17,937,683
New Hampshire	386	6,079,442	4,594	2,817,671	7,519,431
Vermont.....	418	5,409,750	4,216	2,183,068	5,888,441
Massachusetts..	296	3,283,773	1,942	2,428,441	4,903,714
Rhode Island...	22	156,141	198	100,177	401,170
Connecticut....	114	839,567	1,069	499,802	1,562,254
New York.....	820	12,599,876	8,186	5,309,703	13,310,413
New Jersey ..	114	825,375	900	313,611	1,116,884
Pennsylvania ..	1,212	22,677,322	16,674	10,005,505	31,642,390
Delaware	75	242,175	322	143,979	430,443
Maryland	203	1,735,837	1,979	1,043,346	2,750,339
Virginia.....	804	9,839,646	12,190	3,339,475	13,040,860
North Carolina	1,212	10,068,358	14,491	4,470,020	15,731,379
Total	6,428	$88,840,657	77,789	$39,738,929	$116,235,401
Georgia.....	793	$10,717,658	15,364	$2,996,891	$14,435,563
South Carolina.	439	7,237,725	9,656	1,617,713	6,791,451
Florida	198	11,556,330	10,408	2,870,497	10,901,650
Alabama.....	590	12,625,688	14,682	3,909,616	15,939,814
Mississippi.....	618	23,439,225	21,233	5,893,360	24,035,539
Louisiana.....	421	37,385,028	26,353	8,796,944	35,192,374
Texas.....	299	18,426,242	13,332	3,642,484	16,278,240
West Virginia..	633	12,442,475	10,460	3,763,461	14,933,472
Total	3,991	$133,830,371	121,488	$33,490,966	$138,508,103

The *agricultural industries* constitute a fourth source of traffic. The following table (No. XX), compiled from the reports of the United States Department of Agriculture, shows the production, in 1909, of corn, wheat, oats, barley, rye, buckwheat, potatoes, hay, tobacco, swine, sheep and cattle. The aggregate farm value of these products in the States mentioned is reported at $688,000,000. This, moreover, does not include the truck farming and gardening output, which is of vast proportions in these States, and, in the case of New Jersey, is regarded as one of the probably important items of traffic for the proposed canal.

TABLE XX.

Agricultural Products, 1909.

(In thousands.)

State	Corn (bus.)	Wheat (bus.)	Oats (bus.)	Barley (bus.)	Rye (bus.)	Buck-wheat (bus.)	Pota-toes (bus.)	Hay (tons)	Tobacco (lbs.)	Swine (No.)	Sheep (No.)	Cattle (No.)
New Jersey	9,483	1,969	1,530	.....	1,288	283	7,200	546	.....	152	44	272
Pennsylvania	48,800	26,265	25,948	196	5,508	5,655	23,790	3,742	30,732	931	1,000	2,057
New York	24,120	8,820	37,365	1,910	2,720	7,512	52,560	5,002	7,050	656	825	2,660
Delaware	6,200	1,652	102	.....	14	40	864	109	.....	46	7	60
Maryland	21,980	11,165	711	32	282	149	2,800	356	17,750	273	125	298
Virginia	47,328	8,848	3,800	86	184	378	5,520	606	120,125	774	365	875
Connecticut	2,460	.....	302	.....	187	58	4,320	564	22,110	47	38	218
Rhode Island	365	.....	50	.....	.....	.....	750	68	.....	13	8	36
Massachusetts	1,786	.....	217	.....	65	58	4,250	673	7,040	68	35	280
Vermont	2,405	25	2,608	450	31	176	4,650	1,009	335	95	229	495
New Hampshire	1,053	.....	441	50	.....	44	2,730	621	170	51	74	215
Maine	646	230	4,588	228	.....	664	29,250	1,330	.....	62	254	314
North Carolina	48,686	5,415	3,234	.....	122	99	1,850	242	144,000	1,356	215	746
Total	215,312	64,389	80,896	2,952	10,401	15,116	140,534	14,958	349,312	4,524	3,219	8,526
Value	$159,740	$71,900	$41,190	$2,092	$8,378	$10,457	$80,565	$224,668	$34,402	$39,417	$17,388	$248,197

IV. BARGE TRAFFIC OF THE NORTH ATLANTIC

Though the use of the proposed waterway will not be confined to barges, it will be primarily a barge canal. The present amount of this traffic and its various special features and advantages may well be considered in this report.

Table No. VII, compiled from the United States Census report on water transportation, shows that in 1906 there were 8,699 unrigged craft, with a gross tonnage of 2,260,622 tons, employed on the Atlantic and Gulf coasts. The gross tonnage of these barges and canal boats exceeded that of steamers engaged in carrying passengers and freight by 1,214,811 tons, and of sailing vessels thus employed by 1,154,721 tons. They comprised 46.6% of the total gross tonnage of the Atlantic and Gulf coasts. The sailing tonnage, moreover, includes 323,618 gross tons of "schooner barges" which are equipped with sail, but are towed. They are the "sea-going barges" employed largely on the North Atlantic in the carriage of coal, building materials and other bulky materials, and many of them are especially suited to a large and improved inland waterway.

A large portion of the unrigged craft are in the harbor service, but many are also employed in the movement of freight between ports. The following table (No. XXI) shows the number of barges enrolled at some of the leading ports immediately adjacent to the proposed canal. These craft comprise mainly the documented barges engaged in the coastwise business. They do not include the undocumented craft, which comprise over 78% of the unrigged craft of the Atlantic and Gulf coasts.

TABLE XXI.

Documented Canal Boats and Barges of Ports Adjacent to the Proposed Canal.

State	No.	Gross tonnage	Average gross tonnage
Maine	12	5,389	449
New Hampshire	13	1,341	103
Vermont	7	716	102
Massachusetts	23	8,161	355
Rhode Island	7	1,602	229
Connecticut	151	45,154	299
New York	2,394	529,777	221
New Jersey	205	55,389	270
Pennsylvania	167	64,574	386
Delaware	14	4,955	354
Maryland	111	28,670	258
Virginia	34	13,690	402
North Carolina	17	1,091	64
Total	3,155	760,509	241
United States (total)	4,335	928,455	214
United States (barges)	3,590	847,504	236
United States (canal boats)	745	80,951	108

There has been within recent years a marked increase in the

relative number and tonnage of barges. The returns of the United States Commissioner of Navigation show that for the country as a whole there has been a steady decline of the documented sailing tonnage from 4,622,609 tons in 1861 to 1,711,076 in 1909. The gross tonnage of documented steamships during the same years increased from 710,463 to 4,749,224 tons. The introduction of barges is a more recent movement. From 213,156 gross tons in 1868 the tonnage of documented barges has increased to 847,504 in 1909.

The United States Census returns further show that the gross tonnage of all unrigged craft, documented and undocumented, increased from 4,973,356 tons in 1889 to 7,129,631 in 1906, and their number from 16,937 to 20,263. The movement, furthermore, has been primarily on the Atlantic and Gulf coasts, where the gross tonnage of all unrigged craft grew from 623,483 gross tons in 1889 to 2,260,622 in 1906, or by 262.6%. Their number increased from 3,425 in 1889 to 8,699 in 1906, or by 154%, and their value from $7,837,440 to $41,658,685, or by 431.5%. As previously mentioned, the sailing tonnage, moreover, includes 389 schooner barges with a gross tonnage of 323,618 tons. The following table, compiled from the Census reports of 1889 and 1906, shows that this increase in barge traffic has been within recent years, in every respect, more rapid on the Atlantic and Gulf coasts than the increase in steam traffic. It likewise emphasizes the absolute as well as relative decline of sailing vessel tonnage. (Table XXII.)

TABLE XXII.

Relative Growth of Unrigged Craft on Atlantic and Gulf Coasts. (United States Census.)

ITEM	1889	1906	Per cent. of Change
Number of steam vessels...	2,536	5,413	113.4 increase
" " sailing vessels...	6,277	5,920	5.7 decrease
" " unrigged craft ..	3,425	8,699	154.0 increase
Gross tonnage (steam).....	741,770 tons	1,457,894 tons	96.5 "
" " (sailing)	1,293,192 "	1,132,905 "	12.4 decrease
" " (unrigged)...	623,483 "	2,260,622 "	262.6 increase
Value of vessels (steam)....	$65,518,640	$193,926,327	196.0 "
" " " (sailing) ...	42,685,982	37,520,903	12.1 decrease
" " " (unrigged) .	7,837,440	41,658,685	431.5 increase

The decline in sailing tonnage and increase in barge and steam tonnage is shown also in the following table (No. XXIII), which is based on the "Record of American Shipping," and includes only domestic sea-going coastwise vessels.

TABLE XXIII.

VESSEL	1891		1901		1911	
	No.	Tonnage	No.	Tonnage	No.	Tonnage
Sail	1,347	615,885	741	430,199	594	404,237
Barge.....	8	7,976	95	83,061	160	157,502
Steam	120	180,670	97	151,937	145	283,393
Total	1,502	804,476	933	675,197	899	845,132

Barges and schooner barges are a distinct development in coastwise water transportation. The latter are devised to partly overcome the danger of the open-sea route. They are rigged with short masts and a limited amount of sail, so that they may not be entirely helpless in case they break away from their towing steamer or tug. They are largely responsible for the marked decline in the use of sailing vessels for coastwise coal, lumber, phosphate rock and other bulky cargo.

The conversion of the steam collier fleet of the Philadelphia & Reading Railway into a fleet of schooner barges is a striking instance in which the schooner barge has displaced the steamer. As is stated by the Bureau of Corporations, "with the development of other types of vessels, the time consumed in receiving and discharging cargo and the expense of the larger crew continuously maintained placed these steam colliers at a disadvantage. They were, for the most part, sold or converted into schooner barges, while their place has been taken by a fleet of tugs and schooner barges."

Advantages of Barges as Means of Transportation. Barges and schooner barges have various distinct advantages over sailing vessels and steamers. First, their initial cost is smaller. The inland barges are built to obtain the greatest possible capacity upon a given depth of water; but, being towed and used strictly for freight, they are not built with beauty of design. Sea-going barges are larger, but are likewise built for economy. Numerous sailing vessels and some steamers have, at small expense, been converted into sea-going barges.

Second, they are towed by tugs or steamers, singly or in fleets of two and three. Inland barges are sometimes towed in fleets of as many as six barges. This means that the costly machinery of the tug serves to transport several craft, just as the locomotive hauls a train of cars. Likewise the tug can be more continuously employed than can either the steamer or sailing vessel. While the barges which it has brought to port are being loaded or unloaded, it can return to its point of origin with another fleet of empty or loaded barges.

Third, this constant employment of motive power results in a higher degree of efficiency. As is reported by the United States Bureau of Corporations, "The efficiency of the schooner barge in the coal movement is illustrated by the comparisons of the new Philadelphia and Reading fleet of 11 tugs and 63 barges with the former fleet of 15 steam colliers of the same line. The average carrying capacity of the steam collier was 1,200 tons, the average of the barges is 1,600 tons, and the Class A barges have a capacity of 3,300 tons. The old fleet could, in about 500 voyages, deliver approximately 600,000 tons a year, while the schooner barges in 300 voyages from Philadelphia to eastern ports and return, aggregating about 1,150 barge cargoes, can deliver 2,400,000 tons of coal in twelve months."

Fourth, economy results also from the small number of men in a barge crew. Being towed, each barge in a fleet of even the large sea-going schooner barges is manned by a crew of but three or four men.

Fifth, as compared with sailing vessels, the sea-going as well as the inland barge lines have the advantage of greater regularity of service. Inland barges, however, can be relied on within closer limits than sea-going barges, because they are not hindered to any great extent by the storms and heavy seas which the latter too frequently encounter.

The advantage in dollars and cents of the barge over the schooner is shown in the following comparative statement of

relative costs and operating expenses of a schooner carrying 1,000 tons dead weight or 500,000 feet of lumber via the outside route and a barge of similar capacity via the outside route:

TABLE XXIV.

	Schooner outside route	Barge outside route
Cost of construction, ...	$40,000.00	$15,000.00
Crew and provisions, per month	445.00	90.00
Insurance per annum	2,800.00	637.50
Depreciation	2,000.00	750.00
Freight—lumber from Virginia (other commodities in comparison)	$3.00-3.50	$2.00-2.25

Barge transportation is particularly adapted to bulky freight, such as coal, lumber, sand, stone, gravel, fertilizers and phosphate rock, lime, cement, ice, grain, farm produce, brick, tile, terra-cotta, iron ore, pig iron and steel, structural iron, railroad ties, paper and wood pulp, hides and similar products which are available for carriage on the north and south Atlantic coasts. On an inland route the barges are suitable also for package freight, for such barges are protected from the seas and have the advantage of regularity and safety to almost the same extent as regular line steamers.

The economy of using barges over shipping by rail is partly shown in the comparison of the rates on typical commodities when moving respectively by rail or by barges. Table XXV contains a large number of such comparisons. Most of them are made with exactness, but in some instances the barge and rail rates are not quoted on the same basis. In such cases the actual railroad rates were converted into an approximate equivalent of the barge rates. In doing so a cord of pine or pulp wood was rated at 3,500 pounds, a thousand feet of green or wet southern pine at 3,500 pounds, and a railroad tie at 150 pounds. The actual railroad rates are, however, included in the table.

Great as is the balance in favor of the barge lines as shown by these relative rates, the difference would be somewhat greater in case the proposed waterway were constructed. As compared with the barges now using the inland route, the 2,000-ton barge could, because of its far greater capacity, carry its freight at a lower rate. Two other factors, considered in other parts of this report, likewise would tend toward lower rates than rule at present. The one relates to the tolls which are now charged by the inland canal companies, and which would be removed on a free government waterway. The other refers to the reduced marine insurance rates on barges and barge cargoes when using an inland route. They are now from 50% to 75% lower than via the outside route. Coastwise barges are obliged to pay from 8% to 12% or go uninsured and protect themselves when possible by higher rates of freight.

It is estimated that a 1,000-ton barge, loading 75% capacity cargo (750 tons), can be profitably operated through the proposed free ship waterway across the State of New Jersey, between Philadelphia and New York, at an average rate of freight of forty-five cents per ton of 2,000 lbs. (See Exhibit "A," Appendix C.)

In like manner, a 2,000-ton barge, loading 60% capacity cargo (1,200 tons), could be operated at an average freight of thirty-five cents per ton of 2,000 lbs. (See Exhibit "B," Appendix C.)

Terminal charges are not embraced in the above freight rates.

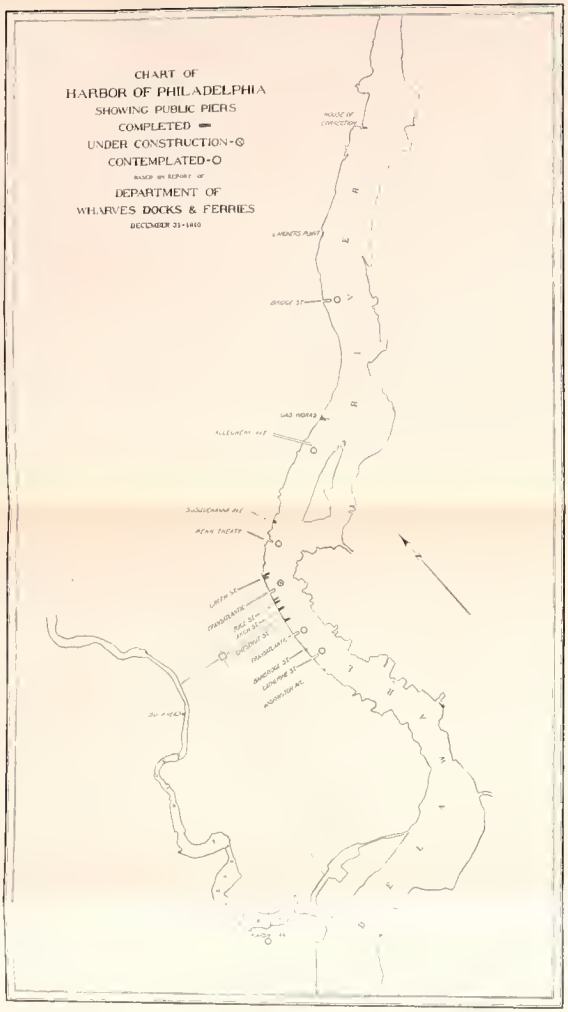


CHART OF
HARBOR OF PHILADELPHIA
SHOWING PUBLIC PIERS
COMPLETED —
UNDER CONSTRUCTION-⊙
CONTEMPLATED-O
BASED ON REPORT OF
DEPARTMENT OF
WHARVES DOCKS & FERRIES
DECEMBER 31-1910
HOUSE OF CORRECTION
LANDERS PLANT
BRIDGE ST
LAS HOMAS
ALLEGHENY AVE
SUSQUEHANNA AVE
GIRARD AVE
LAUREL ST
TRANSFERATOR
RACE ST
VINE ST
CHESTNUT ST
WALNUT ST
SPRUCE ST
PINE ST
LOMBARD ST
CATHARINE ST
WASHINGTON AVE
DELAWARE
SCHUYLKILL
FAIRMOUNT PARK

TABLE XXV COMPARATIVE RAIL AND BARGE RATES

	Origin and Destination		Barges	Equivalent freight rates in cents per 100 lbs. to Barge rates per 1000 feet or per ton as specified.	Rail freights to or from destinations specified	Equivalent to Rail rates per 1000 feet, or per ton, as specified
Commodity	From	To	Rate of Freight			
Lumber	Jacksonville	Philadelphia	$4.75 to $5.00 per 1000 feet	13.57c per 100 lbs.	22c per 100 lbs.	$7.70 per 1000 feet
"	Savannah	"	4.75 to $5.00 " " "	13.57c " " "	23c " " "	8.05 " " "
"	Norfolk	"	2.00 " " "	$1.14 per 2000 lbs.	$1.80 per ton 2000 lbs.	3.15 " " "
"	Newberne	"	2.75 to $3.00 " " "	7.86c per 100 lbs.	16c per 100 lbs,	5.60 " " "
"	Baltimore	"	2.00 to $2.25 " " "	$1.14 per 2000 lbs.	1.80 per ton 2000 lbs.	3.15 " " "
Sand	Philadelphia	Baltimore	75c per ton 2000 lbs.	75c per ton 2000 lbs.	1.25 " " " "	1.25 per ton 2000 lbs.
"	"	New York	85c to $1.00 per ton 2000 lbs.	85c " " " "	1.60 " " " "	1.60 " " " "
"	"	Norfolk	75c per ton 2000 lbs.	3.75c per 100 lbs.	11c per 100 lbs.	2.20 " " " "
Railroad Ties	Norfolk	Philadelphia	11c to 12c per tie	6.28c " " "	9c " " "	15¾c per tie
Railroad Iron	Baltimore	"	1.25 per ton 2240 lbs.	5.58c " " "	10c " " "	2.24 per ton 2240 lbs.
Pig Iron	Norfolk	"	95c to $1.00 per ton 2240 lbs.	95c per 2240 lbs.	1.95 per ton 2240 lbs.	1.95 " " " "
Pine Wood	"	"	2.00 per cord	5.71c per 100 lbs.	11c per 100 lbs.	3.85 per cord
Pulp Wood	"	"	1.80 " "	$1.03 per 2000 lbs.	2.20 per ton 2000 lbs.	3.85 " "
Fertilizer	Philadelphia	Norfolk	1.00 to $1.25 per ton 2000 lbs.	$1,00 " " "	1.60 " " " "	1.60 per ton 2000 lbs.
Coke	"	Baltimore	80c per ton 2000 lbs.	80c per 2000 lbs.	1.20 " " " "	1.20 " " " "
"	"	Norfolk	1.00 per ton 2000 lbs.	$1.00 " " "	2.00 " " " "	2.00 " " " "
Stone	Port Deposit	"	40c to 50c per ton 2000 lbs.	40c " " "	1.90 " " " "	1.90 " " " "
Brick	Philadelphia	"	90c to $1.00 per ton 2000 lbs.	90c " " "	2.20 " " " "	2.20 " " " "
Cinders	"	New York	85c to $1.00 per ton 2000 lbs.	85c	1.90	1.90
Coal	"	Boston	65c to 75c per ton 2240 lbs.	65c per 2240 lbs.	*2.65 per ton 2240 lbs.	2.65 per ton 2240 lbs.
"	"	Providence	55c to 60c " " " "	55c " " "	2.70 " " " "	2.70 " " " "
"	"	Norfolk	40c to 50c " " " "	40c " " "	2.00 " " " "	2.00 " " " "
"	"	New York	60c to 75c " " " "	60c " " "	1.95 " " " "	1.95 " " " "
"	"	Newberne	75c per ton 2240 lbs.	.....	no rate	.....
"	"	Savannah	90c " " " "	.....	no rate	.....
"	"	Charleston	90c " " " "	90c per 2240 lbs.	5.00 per ton 2240 lbs.	5.00 per ton 2240 lbs.
"	"	Jacksonville	90c " " " "	90c " " "	5.00 " " " "	5.00 " " " "
"	"	Portland, Conn.	70c to 80c per ton 2240 lbs.	.....	no rate	.....
"	"	Portsmouth	70c to 80c " " " "	70c " " "	3.15 per ton 2240 lbs.	3.15 per ton 2240 lbs.

NOTE.—Figures of lowest Barge rate used. The two outer columns are to be compared to get equivalent rates by barge and rail.
* R. R. rates on coal are from Shamokin, Schuylkill District.

It is estimated that, availing of the most modern, comprehensive, up-to-date loading and discharging facilities, twenty-five cents per ton of 2,000 lbs. would cover handling of cargo into and out of

barges, divided 10 cents per ton for loading and 15 cents per ton for discharging. This would make the total transportation charges payable by the shipper 60 to 70 cents per ton.

Barges operated as above, it is estimated, would net their owners, respectively, 23 2-10% and 20 8-10% per annum upon capital invested.

Barge and railroad transportation may also be compared as regards time taken in transit. One of the most frequent complaints of shippers and consignees is that of delays in rail deliveries. A large manufacturer of Riverside, N. J., for example, writes: "Our trade with the East is very seriously hampered by slow deliveries on the part of the railroad companies on account of congestion in and around New York and the necessity of transfers between connecting roads to reach New England points." A heavy shipper of Camden, N. J., writes: "We find it almost impossible to make prompt deliveries on New England shipments from Philadelphia by present facilities. Boat connection by an inside route between here and New England will be of the greatest possible service for prompt deliveries, and lower freight except in such inland towns throughout New England or eastern New York State, where it would be necessary to make transfer for a long haul." A Philadelphia lumber dealer writes: "The time of delivery by water is always more exact and less unreliable than railroad time of delivery." A Philadelphia shipper of brass goods says: "Water transportation can be relied on for deliveries; the railroads cannot. The canal would cut down the time to Boston by one day, and shipments to New York could be made over night." A concrete company of Philadelphia writes: "We find the water route much quicker than the railroad to all coast points."

Similar statements were received to the effect that the canal would reduce present delays in coastwise water transportation. A large New York shipper writes that he is "now delayed by weather, entailing losses amounting to thousands of dollars," and that this "condition would be relieved by the canal." A shipper of Chester, Pa., writes that the "canal would save two days on a round trip between Cape Breton and Chester, and would avoid bad weather." A Philadelphia manufacturer writes that the canal "would cut down the delay of getting through steamers from Boston," as he "could use sound steamers to New York and transship." The effect of the canal upon delays would influence not only barges, but all steamers that might use the canal route.

DEPENDENCE OF BARGE TRANSPORTATION UPON AN INLAND ROUTE.

1. Water shipments are now restricted by the scarcity of sailing vessels. A large Philadelphia coal company writes that it is "seriously hampered by the scarcity in sailing vessels, of which there is a marked falling off." A large pipe and foundry company of New Jersey writes: "It is frequently necessary to wait a week or more before suitable sailing vessels can be obtained." There are examples of other complaints made as to the scarcity of sailing vessels.

2. Barges engaged in the coastwise trade suffer from the lack of an adequate inland route. The list of disasters during the ten years ending in 1910 to vessels engaged in the coastwise trade of the Atlantic and Gulf coasts is only a partial index to the dangers encountered. Table No. XXVI, compiled from the revised reports of the Life Saving Service, however, show that during the decade 1900 to 1909 5,715 disasters were officially reported, involving a known vessel loss of $30,380,915 and a known cargo loss of $10,168,640, a known tonnage of 483,741 was totally lost and 3,289,200 tons were

damaged. The figures of value, moreover, are not complete, those stating loss to vessels included but 539 disasters in 1909, and those showing loss to cargoes included but 125 disasters. But it is noteworthy that the known loss to cargoes and vessels during the decade ($40,549,555) is in excess of the estimated cost of building the proposed waterway, with a depth of 18 feet and a width of 125 feet ($32,250,000). In addition to the heavy loss to property, the Life Saving Service reports from 49 to 1,147 lives lost annually in the Atlantic and Gulf Coastwise service—*a total of 2,223 for the decade.* Certainly a heavy toll of human lives.

TABLE XXVI.

Disasters to Vessels on Atlantic and Gulf Coasts During the Period July 1, 1899, to June 30, 1909.

Year	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	Total, 1900-1909
Number of vessels	539	582	571	621	540	558	550	492	687	575	539	5,715
Loss of vessels (known)	$3,379,825	[$4,420,690	$1,943,435	$3,186,050	$2,646,490	$2,898,235	$3,259,985	$2,312,010	$3,162,515	$3,171,680	$3,379,825	$30,380,915
Loss of cargoes (known)	$1,377,295	$2,242,725	$669,890	$1,097,375	$660,485	$603,505	$1,219,360	$764,150	$692,175	$841,680	$1,377,295	$10,168,640
Vessels totally lost (known)	103	179	175	185	166	173	165	137	215	177	103	1,675
Vessels damaged (known and unknown)	436	403	396	436	374	385	385	355	472	398	436	4,040
Tonnage totally lost	48,013	52,018	35,585	63,554	44,989	48,446	48,966	29,147	65,685	47,340	48,013	483,743
Tonnage damaged	395,375	304,006	295,071	287,443	289,551	313,018	271,063	292,658	386,166	454,849	395,375	3,289,200
Lives lost	60	257	49	73	87	1,147	86	76	334	54	60	2,223

Table No. XXVII classifies the above disasters of 1908 and 1909 according to the type of vessels. The number of barges wrecked is far less than of schooners and steamers, because only a small portion of the barge fleet uses the open-sea route, and these start upon a voyage only under favorable conditions. The disasters to steamers and schooners indicate to some extent, however, the risks that would be encountered if the entire barge fleet were deprived of an inland route.

TABLE XXVII.

Classes of Vessels Lost or Damaged on Atlantic and Gulf Coasts.[1]

Class of Vessel	Number of Vessels (1909)	Number of Vessels (1908)	Number of Vessels (1907)
Barges	44	74	51
Barks	5	3	21
Barkentines	6	4	4
Brigs	..	2	..
Brigantines	1	3	..
Dredges	1	..	..
Ferryboats	25	13	28
Schooners	172	220	299
Scows	6	5	3
Ships	..	1	1
Sloops	6	15	20
Steamers	223	195	208
Steam canal boats	..	1	..
Steam yachts	11	7	8
Yachts	1	3	2
Unknown	..	..	6
Total	501	546	651

[1] Figures from regular reports of Life Saving Service, the totals of which do not agree with the revised figures of Table XXVI.

TABLE XXVIII.

Causes of Disasters to Vessels on Atlantic and Gulf Coasts (1909).[1]

Cause	Number of vessels
Calms, currents and tides	9
Darkness	3
Fog	32
Gales, hurricanes, etc.	58
Heavy seas	10
Snowstorms	6
Errors in compass	1
Errors of officers, masters and crew	16
Error of pilots	3
Damage to Machinery	7
Absence of buoys	5
Capsized	2
Explosion	5
Fire	53
Ice	1
Missed Stays	4
Sprung a leak	17
Struck bridge, pier, rock, etc.	33
Water logged	1
Collisions	220
Miscellaneous	9
Unknown	6
Total	501

[1] Figures from regular reports of Life Saving Service, the totals of which do not agree with the revised figures of Table XXVI.

The recent loss of seventeen lives and three coal barges of the Reading Coal and Iron Company's fleet is still fresh in the public mind. The barges Trevorton, Corbin and Pine Forest, in tow of the tug Lykens, bound from Philadelphia to New England coal ports, encountered two serious coast storms. Barely surviving the first, they were completely wrecked by the second in full sight of three life-saving crews, who were unable to render assistance to the helpless captains and crews in the raging seas.

Appendix B contains a detailed list of the leading wrecks, involving total loss of vessel, which occurred during the years 1906 to 1910, inclusive, on the Atlantic and Gulf coasts. Appendix B is thus not comparable with the tables XXVI and XXVII. The accompanying chart graphically shows the points at which the wrecks occurred on the coast from Portland, Me., to Cape Hatteras during these years.

MARINE INSURANCE.

The large annual loss of life and property in the coastwise business emphasizes the importance of marine insurance. Sea-going barges are such poor risks that marine insurance companies will not insure them except at very high rates. Coastwise sailing vessels have long complained of the difficulty of getting insurance, and it is regarded as one reason for their decline. Outside barges are in much the same position, for many are refused all insurance. The rates on barge hulls, on the outside route, range from 8% to 12% annually, as compared with an average of 4% on the inside route. If staunch sea-going barges were provided with an inside route the difference would be even greater, because they would be a better risk than the average inland barge at present engaged in the trade between Atlantic ports. As it is at present the insurance rates are so high that many barges go uninsured, and their owners either bear the risk of loss or attempt to protect themselves by charging higher freight rates. Some barges carry only fire insurance and go unprotected against other more serious marine risks. Some of the barge lines consulted regard the difficulty of obtaining insurance and the danger of the open-sea route as the prime obstacle confronting them. There are instances where barges are sent through the Delaware and Raritan Canal partly loaded in preference to sending them via the outside route because of the risk involved. The marine insurance companies, on their side, claim that even at high rates they are not eager to insure sea-going barges.

Cargo insurance is usually, though not always, left to the shippers and consignees. It is stated that the insurance rates on perishable goods or any cargo that can be damaged by water are prohibitory, or insurance is refused. Lumber, coal and similar bulky cargoes are accepted, but at high rates. An official of a large marine insurance company stated that the average rates per trip on acceptable cargoes are about ½% between New York and Philadelphia via the outside route, as compared with ¼% via the Delaware and Raritan. These inside rates would perhaps be somewhat lower in case a canal for larger barges were provided. Comparisons with the insurance rates on steamship cargoes are difficult because of the difference in kind of cargoes carried. The rates on lumber carried from Savannah to Philadelphia, however, are usually ⅛ of 1 per cent. per trip, as compared with 1½% when carried by barges. These rates are given as fairly representative of the difference between cargo insurance rates on steamers as compared with sea-going barges. The cargo insurance rates on inside barges are at present about 50% less via the open sea.

The present canals paralleling the North Atlantic are wholly inadequate to meet the demands of barge traffic. The Delaware

and Raritan has a depth of 8 and 9 feet, with a vessel draft of 7 feet, and the Chesapeake and Delaware a depth of 10 feet, with a vessel draft of 9 feet. The former carried 401,231 tons of freight in 1909, and the latter 818,386 tons. The traffic of the Delaware and Raritan declined from 2,837,532 tons in 1872, and that of the Chesapeake and Delaware from 1,318,772 in 1872. Southward from these canals are the Dismal Swamp and Albemarle and Chesapeake Canals, which afford a gateway to Newbern, N. C., but their depth is likewise 9 feet.

The decline of traffic on the Delaware and Raritan is evidence neither of any lack of demand for canal transportation nor of the inability of the proposed waterway to handle large quantities of freight. The Delaware and Raritan was defeated largely by its inadequate dimensions. The carload and trainload of freight and the railroad locomotive have continually increased in proportions, while the inland barge has long been limited by the dimensions of this canal and those to the south. Railroad transportation has become more economical, while that of the Delaware and Raritan has, if anything, become less so, for it has been allowed to deteriorate, high tolls have been levied and it is closed to navigation during a long winter season. Since 1871, when it was leased for 999 years, it has been operated by the Pennsylvania Railroad.

In addition to its small dimensions and scanty maintenance, the Delaware and Raritan Canal levies canal tolls. The rates of toll between Bordentown and New Brunswick vary from 35 cents per 2,240 pounds on sixth-class freight to $1.50 on first-class freight. On way freight the charges vary from 1 cent per 2,240 pounds per mile on sixth-class freight to 3 cents, 5 mills ($.035) on first-class freight. It is specified, however, that "boats carrying full cargoes of fifth and sixth-class freight one way will be free of boat tolls and lockage, both going and returning, excepting way boats, which will be charged $1.00 each way for passing Wells Falls outlet lock."

Rates of Toll on Delaware and Raritan Canal.[1]

Governed by Official Classification	Between Bordentown and New Brunswick per 2,240 lbs.	Between Way Points per Mile per 2,240 lbs.	
		Cents	Mills
First class freight	$1.50	3	5
Second " "	1.20	3	0
Third " "	.70	2	5
Fourth " "	.45	1	5
Fifth " "	.40	1	2
Sixth " "	.35	1	0

[1] Except coal and coke.

Towage charges are also regularly published. From Philadelphia, for example, to Bordentown they are 8 cents per ton of 2,240 lbs.; to Keyport, 25 cents; Perth Amboy, 15 cents; Newark, 25 cents, and Hudson City, 26 cents. These tolls and towage charges have deterred many from using the canal. A Philadelphia lumber dealer, for instance, writes: "We have often tried the canal, but toll and towing charges make it prohibitory." A shipper of Chester, Pa., writes: "We cannot use the canal for manufactured goods because of high toll charges."

On through shipments to or from the South, the Delaware and Raritan, moreover, depends upon the Chesapeake and Delaware Canal, and here, likewise, tolls are levied. On barges carrying

ashes, clay, sand, manure or shells the tolls are 15 cents per ton; on common brick, 20 cents per ton; fire brick, 30 cents per ton; coal, 15 cents per 2,240 lbs.; fertilizers, from 15 to 50 cents per ton; pig iron, 20 cents per ton; lumber, 30 cents per 1,000 feet; posts (locust, cedar, oak or chestnut), $1.25 to $1.50 per 100; railroad ties, 2 cents each; stones, 15 to 30 cents per ton; wood, 30 to 35 cents per cord, and timber piles, 15 to 35 cents each. These are sufficient to illustrate the general level of the tolls of this canal.

An inland waterway large enough to accommodate a barge of 2,000 tons or more is in an entirely different category than the present canals of the North Atlantic, the largest craft of which are of 700 and 800 tons. The present operation of these barges on the open sea at owner's risk indicates the inadequacy of the present canals and the urgent need for an inland route of larger dimensions, better maintenance and freedom from heavy tolls.

EXPANSION OF BARGE TRANSPORTATION BY PROPOSED CANAL.

The above-mentioned facts are sufficient to show that a large majority of the barges at present engaged in the traffic of the North Atlantic would use the proposed canal. The committee has received abundant assurances that existing barge lines would use the inland route with all but their very largest sea-going barges, which could not move through an 18-foot canal. A large New England barge line writes: "All our outside barges, excepting our two largest, could use this proposed canal, and it would be a great advantage to us to be able to use it. It would not only avoid the danger of the sea route for our outside barges, but would also enable us to send our smaller barges to Philadelphia that now load at New York ports. We transport coal almost entirely in our barges, with occasional cargoes of pig iron from Southern ports, and we transport annually about 350,000 to 400,000 tons. Practically all this amount could be shipped through this canal." The prospective tonnage of a single barge line, therefore, equals the entire tonnage of the present Delaware and Raritan Canal.

A prominent New Jersey transportation line writes: "We are in a position to state that we could save between 30 and 60 days annually if we were in a position to send our vessels through canals. We have been delayed several times at Delaware Breakwater, Vineyard Haven, Sandy Hook, Cape Henry and Baltimore, entailing considerable loss to us. The cost of insurance is prohibitive, and if such a state of affairs continues I am unable to tell where our marine business will land."

Not only would a large share of the barges at present plying between Atlantic coast points use the proposed canal, but transportation companies would in many cases expand their business by adding more barges. Various barge lines at present operating chiefly from Chesapeake Bay points to Philadelphia either do nothing to encourage shipments to New York and New England points, or refuse such shipments because of the inadequacy of the Delaware and Raritan Canal and the dangers of the outside route. They state that their services would be extended materially in case an adequate inland route were provided.

New barge lines would be organized if an inland route were provided. Even under present conditions there has been a marked shifting in coastwise tonnage from sailing vessel to barge, and, to a less extent, from steamer to barge. This movement would increase if barge transportation were made safer and cheaper by the construction of an inland route. A Philadelphia towing com-

pany, for example, writes: "We feel convinced that our business will be increased 100% after the building of such a canal, owing to the tonnage that would ply in the same." A large shipper of Chester, Pa., interested in steamers, writes: "If such a canal is constructed we shall probably build several power barges for use in business which the canal would make possible." A large shipper of Philadelphia and owner of barges writes: "We are convinced, from our experience in the coal trade covering a period of many years, that the proposed canal would be a great benefit, both to consumers and shippers alike, provided the proposed Narragansett Bay and Cape Cod Canals are constructed in conjunction therewith; in that, in the long run, it would tend to lower rates of freight and insurance, effect a saving in time and provide safer transportation. This is assuming that the proposed canal would be open to navigation at all times during the year and free also from all tolls."

A large shipbuilding concern writes: "The construction of the inland waterways along the Atlantic seaboard would, we believe, stimulate the building of barges, tug boats, freight packets and steamers for the transportation of freight through these waterways until as regular and as well-established lines between points adjacent to these waters would be established and maintained as now exist on Long Island Sound or on the Delaware River and Bay; and by such means the cost of transportation and insurance on raw material and manufactured products would be greatly reduced and thereby increase the business of not only this seacoast section, but of the entire country. With canals such as that proposed across New Jersey the question of transportation at reasonable rates would soon be solved by the establishment of regular freight packet lines such as now ply between Wilmington and Philadelphia, New York and points on Long Island Sound, and such as once plied between Wilmington and New York, for shipments of less than full cargoes, and by barges in regular tows or by special tugs for full cargoes."

V. FREIGHT CARTAGE AT PHILADELPHIA

The above comparison of barge rates with railroad rates fairly describes the relative cost of transportation as between railroad freight delivered over private sidings and barge freight which requires no cartage at the terminals. This covers a very considerable portion of both rail and water shipments. The Pennsylvania Railroad has approximately 360 sidings in Philadelphia, the Philadelphia & Reading 350, and the Baltimore and Ohio 100. But, on the other hand, there are many industrial wharves at which cargoes are shipped and discharged directly; and at other ports, particularly Baltimore and most of the smaller ports, the industrial wharf is relatively more important than in Philadelphia. On such direct shipments the cost of shipping by barge, as seen in Table XXV, is materially lower than by rail.

A second condition exists as between rail and barge shipments when both of them require cartage at the terminals. Though there are over 800 railroad sidings in Philadelphia, the United States Census Office in 1905 reported over 7,000 manufacturing establishments. Essential parts of every railroad station are regular receiving and delivery platforms, warehouses and team tracks for direct loading and unloading between cars and trucks.

There is sufficient hauling in Philadelphia to support a large public cartage business. There are approximately 5,000 teams regularly employed by public teamsters in hauling freight to and from railroad stations and to and from the water front. Some of them haul any kind of freight offered at agreed charges, some confine themselves to special classes of freight and others lease a portion of their equipment to manufacturers. Some manufacturers who haul their finished products nevertheless hire public teamsters to handle their raw materials. In addition to the public cartage business, there is considerable hauling by the private teams of department stores and various manufacturers and merchants.

The cartage charge between the business districts and the railroads differ in some cases from those between the business districts and the waterfront, but their general level is not far apart. Cartage charges, therefore, do not vitally affect the comparison of costs as between railroad and barge shipments when both require hauling at the terminals. The difference is chiefly between the rail and the barge rates, and, as shown above, the latter indicate a large saving.

The third condition arises as between railroad rates over private sidings and barge rates on freight shipped or received that requires cartage. In such a comparison the cartage charge is the determining factor. The following table (No. XXIX) makes a comparison based on some of the leading commodities shipped both by rail and water. In some cases the sum of the barge rate and Philadelphia cartage charge is less, and in other cases it is greater than the rail rate over private sidings. In some shipments a cartage charge also arises at the terminal from or to which the barge plies in its Philadelphia shipments. Wherever such double cartage charges are paid the shipper with a private rail siding would gain nothing by using existing barge lines. In many cases, also, when but one cartage charge is to be paid the shipper with

a railroad siding would gain little or nothing by shifting to barges with present barge rates.

TABLE XXIX.

Relative Cost of Shipments at Philadelphia by Rail and Barge, Including Cartage in Barge Shipments.

Commodity	Cartage from water front to business districts	Barge rates and cartage charge to business districts	Railroad rates to and from private sidings
Lumber (per 1000 feet).	$0.75 to $1.50	Norfolk to Philadelphia $2.75 to $3.50	$3.15 per M ft.[1]
Railroad ties per 100 lbs.	.03	Norfolk to Philadelphia $0.10 to $0.13[2]	.09
Brick (common) per 2000 lbs.	.45[3]	Philadelphia to Norfolk $1.35 to $1.45	2.20
Coal (per 2240 lbs.)....	.50	Philadelphia to Boston $1.30 to $1.35	2.65[4]
Coke (per 2000 lbs.)....	1.00	Philadelphia to Baltimore $1.80	1.20
Sand (per 2000 lbs.)....	.80	Philadelphia to Baltimore $1.55	1.25
Pulp wood (per 2000 lbs.)	.60 to 1.00[5]	Norfolk to Philadelphia $1.63 to $2.03[6]	2.20
Pig Iron (per 2240 lbs.)	.67 to 1.12[7]	Norfolk to Philadelphia $1.62 to $2.07	1.95
Clay (per 2000 lbs.).....	1.00[8]	Philadelphia to New York $1.85 to $2.00	1.85
Fertilizer (per 2000 lbs.).	.60 to 1.00	Philadelphia to Norfolk $1.30 to $1.90	1.60

[1] 1000 feet southern lumber rated at 3500 lbs. Actual railroad rate, $1.80 per 2000 lbs.
[2] Railroad ties rated at 150 lbs. each. Actual barge rates, 11 cents to 16 cents per tie.
[3] 1000 bricks rated at 4500 lbs. Actual cartage charge, $1.00 per 1000.
[4] From Shamokin, Schuylkill districts.
[5] Pulp wood at 3500 lbs. per cord. Actual cartage charge, 3 cents to 5 cents per 100 lbs.
[6] Barge rate, $1.80 per cord.
[7] Cartage charge, 3 cents to 5 cents per 100 lbs.
[8] Cartage charge, 5 cents per 100 lbs.
[9] Cartage charge, 3 cents to 5 cents per 100 lbs.

In case the proposed waterway were constructed, barge rates would, as shown previously, be somewhat lower than at present, and this would affect the comparison of barge plus cartage charges and present rail rates over sidings. Sufficient concessions, however, would doubtless be made by the rail carriers to retain the bulk of the freight handled over sidings.

The proposed canal, because of these cartage charges, can afford little if any saving as compared with freight handled over private sidings. It can, however, afford a large saving as compared with railroad freight which requires hauling to and from railroad stations, and on freight which can be discharged and loaded directly at industrial wharves.

VI. WATER TERMINAL FACILITIES

Adequate terminal facilities are an essential part of a waterway. Unless proper water terminals are provided at the ports so that barges, sailing vessels and steamers plying between them in the coastwise trade can readily find wharves at which to load and discharge, there is little to be gained in building an inland waterway for their use. Unless practically the entire available shipments and receipts of any particular port are to and from large industrial concerns which have their own wharves, the port should either regulate private wharves so that they become available for general shipping or provide sufficient open public wharves. Since the former practice is probably not possible as a general rule, the public wharf is essential. Provision should also be made so that barges may as easily as possible run alongside the larger vessels in the various harbors to transship cargoes directly.

The work of providing terminal facilities should be assumed by the various municipalities. A proper division of responsibility would seem to be for the Federal Government to provide the channel, the State to provide the right of way, and the municipalities to provide the terminals, and each of the three parts is essential to the proposed waterway. The Federal Government might possibly be justified in making the appropriation for the building of the waterway contingent upon a guarantee by the interested municipalities that they will provide adequate terminal facilities.

Such guarantee would not be a serious hardship, for existing terminal facilities are at present accommodating a large coastwise traffic. Philadelphia has a total water frontage of 33.4 miles with a depth of 18 feet or over. Of these, 18.8 miles are on the Delaware and 14.6 on the Schuylkill River. The City of Philadelphia owns thirty-seven different pieces of water-front, including street ends, bulkheads, ferry slips and wharves. On the Delaware River 1,402 feet are now controlled by the city and 2,196 feet are leased. Most of the leases, however, expire between the years 1912 and 1915. The city is therefore in a position at present to increase the number of its public wharves and piers on the Delaware, and will be still more so in the immediate future. It likewise owns 6,302 feet of waterfront on the Schuylkill River. It will be highly desirable for the city to construct wharves and piers at various places for some distance up the Delaware River throughout the manufacturing district which borders on the river so that barges and other craft using the proposed canal may find easy and direct access. This would eliminate a large amount of long-distance cartage.

The street ends owned by the city can be made available only for very small barges, but under an Act of 1907 the city may, if it desires, condemn space at appropriate places along the water front.

The City of Philadelphia is taking steps to accommodate its growing commerce. Two piers are at present under construction and plans have been made for the future. The terminal plans at Philadelphia are made clear in the following statement of the Director of Wharves, Docks and Ferries with accompanying charts:

DEPARTMENT OF WHARVES, DOCKS AND FERRIES.

Philadelphia, February 8, 1911.

MR. WILFRED H. SCHOFF, SECRETARY COMMITTEE ON TRAFFIC.

DEAR SIR:—In reply to your letter of the 6th inst., in which you request, on behalf of your committee, information concerning the improvements now under way and projected in Philadelphia Harbor, I have the honor to report that due consideration has been given all matters in connection with the improvements, and provisions will be made for the increased commerce and everything connected with the same, that will take place during the construction of the Intra-Coastal Canal connecting New York and Delaware Bays, and following its completion.

At the present time there is under construction:

1. VINE STREET PIER. A double-deck concrete and steel structure supported on piles, for the heaviest Trans-Atlantic traffic. This pier will be 166 feet wide and 571 feet long, and will be completed by November 1, 1911.

Substructure about seventy-five (75) per cent. completed. Amount of contract	$321,000
Superstructure—contract awarded. Amount of contract	339,000

2. DOCK STREET PIER. A double-deck concrete and steel structure supported on piles, for Trans-Atlantic traffic. This pier will be 120 feet wide and 582 feet long. Plans and specifications have been prepared for the pier, and the money for construction is authorized in the loan about to be negotiated.

Amount of contract	$500,000
Total cost of piers under construction	$1,160,000

The works contemplated are as follows:

3. CATHARINE STREET PIER. A double-deck concrete and steel structure supported on piles, for commercial and recreation purposes. This pier will be 140 feet wide and 570 feet long.

Approximate cost of pier	$450,000
Cost of land	350,000
Total cost	$800,000

4. ALLEGHENY AVENUE PIER. A double-deck concrete and steel structure supported on piles, for commercial and recreation purposes. This pier will be 100 feet wide and 610 feet long.

Approximate cost of pier	$290,000
Cost of 130 feet of dock space	100,000
Total cost	$390,000

5. BRIDGE STREET PIER. A double-deck concrete and steel structure supported on piles, for commercial and recreation purposes. This pier will be 100 feet wide and 640 feet long.

Approximate cost of pier	$304,000
Cost of land	100,000
Total cost	404,000

6. PENN TREATY PARK PIER. A double-deck concrete and steel structure supported on piles, for commercial and recreation purposes. This pier will be 80 feet wide and 467 feet long.

Approximate cost	$211,600

As to the plan for future improvement of the harbor, I enclose herewith print submitted with my annual report for the year ending December 31, 1909, which shows proposed improvements on the Schuylkill River and near the mouth. My recommendations in that case have been adopted and will be incorporated in the comprehensive plan to be submitted to Councils for their approval in the near future.

Further improvements on the Delaware River will, in all probability, be made between the back channel north of League Island and Greenwich Piers, where it is proposed to build long piers, such as shown on the plan submitted with my annual report for the year 1909; not exactly as indicated on that plan, but the idea submitted by me will be adopted to a large extent.

On the chart showing the Philadelphia Harbor I have indicated in red the sites of the piers under construction and the proposed piers. Number 7, near the mouth of the Schuylkill, shows the location of the land recently purchased by the City of Philadelphia for harbor improvements on the west bank of the Schuylkill river, in the vicinity of Penrose Ferry Bridge: 407 acres, with 2,526 feet of frontage on the Schuylkill River. Cost, $205,000.

Trusting this will give you the desired information, I am,

Very respectfully yours,

(Signed) J. F. HASSKARL,
Director (Acting).

A portion of the canal traffic can also be handled at the wharves and piers of the industrial concerns located on the waterfront, for they are themselves shippers and receivers of freight. They include various sugar refineries, a fertilizer company, salt manufacturer, ice company, several oil refineries, gas works, storage company, linseed oil company, and the Cramp Ship and Engine Works. The railroad water terminals are likewise available to some extent. The various coal companies at present use the railroad piers. So do some of the regular coastwise and river boat lines, while others own their wharves or lease them from the city.

At the port of New York the city owns most of the North River waterfront on Manhattan Island from Sixty-seventh street to the Battery, and on the East River as far as Corlears Hook Park. It also owns considerable frontage on the East River, from East Sixtieth to East Twenty-ninth Street; and a limited amount on the Brooklyn side around Wallabout Basin. On the North River, from West Seventieth Street to the Battery, and up the East River to East Forty-second Street, there are 180 piers, and of these the city owns about 150 and partly owns from 5 to 10 others. Much of this city waterfront is leased. There are approximately 200 leases on the Manhattan waterfronts, 158 of which are for periods extending over ten years. While the most important city wharfage is thus covered by time leases, there are many leases of less importance which are at the pleasure of the Commissioner of Docks and can be made available for general use.

There are also various dock and terminal companies, a portion of whose waterfront is available. Such are the New York Dock Company, the Erie Basin and the Bush Terminal Company, whose wharves are south of Brooklyn Bridge; and the American Dock and Trust Company, which owns property on Staten Island.

Numerous piers and wharves are now used by industrial concerns which are prospective shippers and receivers of freight through the proposed waterway, and whose wharfage facilities are assured. On the East River (Manhattan) below 101st Street, there are 10 wharves for ice, 7 for coal, 4 for lumber, and 5 piers are occupied by gas works. On the Brooklyn side north of Dock Street and below Newtown Creek various industrial concerns have wharf-

age facilities. The United States Bureau of Corporations reports that "the banks of Newtown Creek are occupied almost wholly by industrial establishments and concerns engaged in commercial enterprise, such as lumber yards, coal depots, etc."

Baltimore has a total waterfront of 18 miles, of which the city owns 9%, the railroads 17% and industrial concerns and private parties 74%. The upper part of the harbor at present has "extensive wharfage used by coasting and other smaller vessels and bay steamers," and those concerns having their own wharves are not confronted with a terminal problem. Since 1904, moreover, the city has spent over $4,712,000 in building nine city piers and acquiring the necessary property. Of these, No. 4 is open and devoted wholly to smaller boats; No. 8 is open and used for lumber; and No. 6 is open to all vessels.

At intermediate points on the canal, such as Wilmington, Chester, Perth Amboy, South Amboy, etc., the matter of terminal facilities for general cargoes is of far less importance than at the larger termini. Here the chief shippers and consignees with probable canal traffic are, for the most part, the owners of private wharves or have leased wharves which they are now using for water transportation.

While, therefore, the providing of water terminals is of prime importance to the proposed waterway, a large tonnage can be handled at wharves and piers used for the coastwise and inland business. To assure the success of the project, however, the cities should guarantee to provide sufficient wharfage facilities to accommodate all traffic that may seek the canal route.

VII. DEVELOPMENT OF LOCAL INDUSTRIES IN NEW JERSEY

In addition to the through traffic of the proposed canal, a portion of its tonnage will depend upon the local industries along its route throughout New Jersey. These industries are dependent chiefly upon the abundant deposits of clay, sand, gravel and the agricultural resources of that portion of the State through which the proposed route extends. They are already large and will develop further if the waterway is constructed.

The mineral resources adjacent to the canal route do not include any of New Jersey's stone deposits. A line drawn from Trenton across the narrowest part of the State separates the hilly section, which abounds in stone deposits, from the flatter coastal plain, in which rocks are either rare or wholly absent. They, however, include the most valuable clay deposits of New Jersey, which State is exceeded only by Ohio and Pennsylvania in the value of the clay products annually produced.

As is shown in the accompanying map, there are two extensive beds of clay, extending practically the entire length of the canal route from Raritan Bay to Philadelphia and beyond as far as Delaware City. One of these consists of clay marls, suitable for brick; the other of Raritan sands and clays, suitable for stoneware, fire clays and brick. The total value of New Jersey brick and tile output in 1908 was $6,363,700, and $9,019,800 in 1907. The annual output of its pottery industries was valued at $5,949,900 in 1908 and at $6,985,600 in 1907. The total value of all its clay products in 1908 was $12,313,600, and $16,005,400 in 1907.

The clay products of Mercer County are valuable because they include the output of the pottery industry of Trenton. In 1908 sanitary ware, white ware, chinaware, porcelain electrical supplies and other pottery products of Trenton were valued by the United States Geological Survey at $5,649,000, or nearly 95% and 22.5%, respectively, of the pottery output of New Jersey and the United States. Common brick are also produced on a large scale in the region around Trenton and Hightstown. Pressed brick are made at Trenton, as also are fire brick, drain tile, floor and wall tile. Drain tile is likewise made at Hightstown.

Middlesex County, also crossed by the proposed canal route, "is the most important clay-producing county in the State of New Jersey, and its importance was so marked, even at an early date, that in 1878 it was made the most prominent part of the Report on Clay issued by the New Jersey Geological Survey. Indeed, so extensively is the clay-working industry of Middlesex County developed that it is highly probable that the value of the clay products manufactured there, together with the value of the clay mined by persons other than manufacturers, forms about 35% of the total value of the New Jersey clay-working industry." (New Jersey Geological Survey, "The Clays and Clay Industry of New Jersey," 1904.)

The clay products of the county include common, pressed, enameled and paving, hollow and fire brick, terra-cotta, wall tiles, fireproofing and conduits. It also ships much clay to other counties and States. Aside from a few outlying places, such as Jamesburg and Ten Mile Run, the Middlesex clay industries are mainly confined to the northeastern corner, at places such as Perth Amboy, South Amboy, South River, Sayreville, Keasbey, Maurer, Old

Bridge, Woodbridge and Sewaren. This is partly because the best and most available deposits are located there, but also because of the position of this region. "Many parts of the field are traversed by waterways, along which at many points large factories have been erected, and most of the clay pits are in close proximity to them, as well, thus permitting easy shipment by water to many coastal points. The region is also crossed by several important lines of railroad." This same commercial advantage, due to position, would be extended to the clay deposits located further west and south in Middlesex County were the proposed canal constructed.

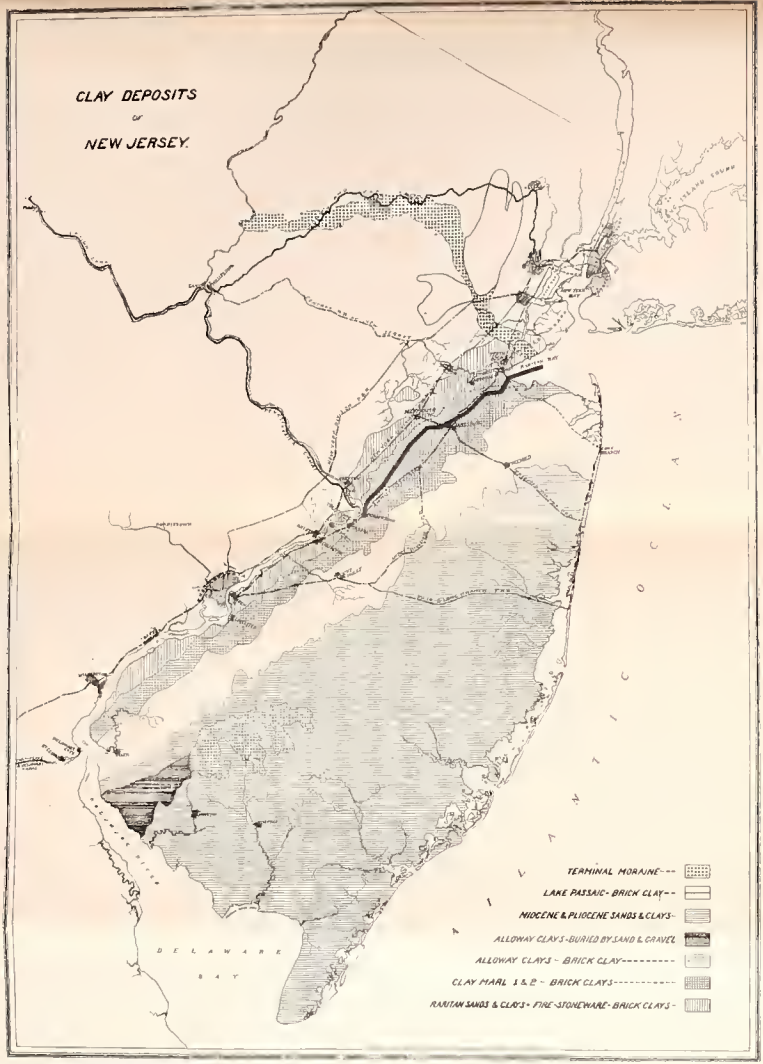
The same clay formation found in Mercer and Middlesex Counties extends through Burlington County along the Delaware River. Common red brick are made in large quantities at Bordentown, Kinkora, Fieldsborough, Edgewater and Maple Shade. Hollow brick are made at Crosswicks and Maple Shade; terra-cotta at Burlington and Moorestown, and whiteware pottery at Bordentown. The construction of a deep channel from Philadelphia to Trenton, as a part of the proposed waterway, would also have an effect upon these clay industries of western Burlington County.

Throughout the counties adjacent to the proposed canal route there are, in addition to the clay beds, large deposits of sand and gravel. In the State as a whole they were worked to the extent of 2,124,000 tons in 1907, and 2,083,600 in 1908.

From 56,000 to 87,000 tons of glass sand were annually used in recent years. These deposits, however, are chiefly in southern Jersey, at points such as Maurice River, Vineland and Williamstown, which are not reached by the proposed waterway. Though but small amounts are produced in the canal region, as at Old Bridge, the following statement of the State Geologist of New Jersey as to the relation between bulky products, such as glass sand, and transportation facilities is pertinent: "On account of the bulky nature of the sand the cost of transportation is one of the leading items that determines the value of a pit, and consequently its life. This naturally confines the productive area of a glass-sand field to the vicinity of a railroad or navigable river. Practically every producing pit in southern New Jersey is less than one mile from a railroad or is along a navigable stream, although there is no doubt but that good undeveloped deposits of glass sand exist elsewhere in this region." (Annual Report, State Geologist of New Jersey, 1906.)

The proposed waterway further taps some of the best agricultural lands of New Jersey, large tracts of which are suitable for truck farming and fruit growing. As long ago as 1899 Burlington County had 20,900 acres devoted to vegetable growing, Mercer County 5,313, and Middlesex County 5,989. In its annual report of 1908-09 the State Board of Agriculture, through the local board of the county, reported that in Mercer County 1,800 acres are devoted to raising potatoes, producing 162,000 bushels annually, valued at $121,500. The value of miscellaneous vegetables and fruits is reported at $452,190; milk, $495,116, and poultry, eggs, etc., at $159,300. The total crop, including grains, is placed at $2,283,416. The president of the Mercer County Board of Agriculture states that "The southern part of the county is particularly adapted for the vegetable and truck business. The northern part of the county is well adapted for raising the larger fruits—apples, peaches, pears, cherries, etc.—while the southern part is well calculated for the small fruits."

Mercer County has a considerable market in Trenton, to which surrounding farmers cart their produce. It is probable, however,


CLAY DEPOSITS
OF
NEW JERSEY.
TERMINAL MORAINE---
LAKE PASSAIC - BRICK CLAY--
MIOCENE & PLIOCENE SANDS & CLAYS-
ALLOWAY CLAYS - BURIED BY SAND & GRAVEL
ALLOWAY CLAYS - BRICK CLAY---------
CLAY MARL 1 & 2 - BRICK CLAYS----------
RARITAN SANDS & CLAYS - FIRE-STONEWARE - BRICK CLAYS -
DELAWARE
BAY
ATLANTIC OCEAN

that the larger market which the proposed canal would make available would result in a rapid growth in their truck farming and fruit-growing industries. Middlesex County also raises considerable crops of potatoes, vegetables and fruits, but all available soils are not utilized. In this, as well as in the northern part of Monmouth County, the proposed waterway would probably stimulate these industries by opening larger markets. Burlington County farmers are nearer to Philadelphia, but those within reach of the Delaware would likewise be affected by the deepening of the channel from Philadelphia to Trenton. A large manufacturer of canned goods in his statement to the committee writes: "The proposed canal would enable the farmer to get his products to Philadelphia or New York markets, thereby, allowing him to utilize his ground for the raising of fresh vegetables, a thing that is now impossible with present transportation facilities." The development of the farming industries of New Jersey is of importance not only to the farmers, but to the consumers, for the food supply is a growing problem to the dense population of the North Atlantic seaboard.

It is probable that the proposed waterway would have somewhat the same effect upon the development of local industries of New Jersey that some of the improved waterways of Europe have had upon those in their adjacent territories. The accompanying map graphically shows the industrial development of Germany along the canalized River Main from Frankfurt to Mainz. In fifteen years existing industries were vastly expanded and many new ones, based upon the available resources and cheap transportation, were established. The British Royal Commission on Canals and Waterways found that the influence of this waterway and of others "had not been limited to single cases, but that numerous industrial establishments of all sorts had settled along or in the neighborhood of the waterways. The waterway has in many cases led to the utilization of mineral resources that would otherwise not have been exploited, for instance, the opening up of stone quarries, sand and gravel pits, and the erection of numerous brick yards, etc." The Royal Commission further notes the decentralizing influence of the waterways. In the case of the Main, "the new industries and the wage earners that they attract, have not settled around the city of Frankfurt, but along the river around less populated centers like Griesheim, Hoechst, etc." The findings of an official inquiry in Prussia likewise concluded that "in conjunction with the railways the navigable waterways exercise a special attraction on industries, and more so than the railways alone have done. Therefore, the waterways, on account of the qualities peculiar to them, appear to have a strong decentralizing influence."

VIII. PROBABLE SHIPMENTS FROM PHILADELPHIA, WILMINGTON, CHESTER, TRENTON, BALTIMORE, NORFOLK, NEWPORT NEWS AND OTHER POINTS AT SOUTHERN TERMINUS OF THE PROPOSED CANAL

The foregoing data relative to present shipments by water and rail, the extent of production in regions that will be affected and the large amount of cartage, supplemented by the testimony of numerous shippers, consignees, barge lines and others interested in the shipment of freight indicate the nature and the large volume of the traffic upon which the canal will draw. Many of the leading commodities likely to seek the canal route have been considered. It has also been pointed out that new traffic would be created by the proposed waterway.

It will be well to consider the traffic by leading commodities. An admittedly heavy item of traffic to points near the eastern and western termini of the canal would be *coal.* Much of the coal now shipped by water from Philadelphia, Baltimore, Norfolk and Newport News would probably take the canal route to destinations on the New England Coast. *Lumber, railroad ties, shingles, wood* and *wood pulp* and *piling* are a second heavy group, for even now large quantities are shipped by water from southern ports to New York, Boston and other New England points. The building materials including *brick, stone, gravel, sand, plaster, cement. lime* and *tile* constitute a third important group of commodities suitable to the proposed waterway. Certain quantities of *iron* and *steel* and *structural iron* are available. So, too, are cargoes of *petroleum and its products, pottery,* Philadelphia and southern *textiles, leather, tobacco, hardware, machinery* and *fertilizers.* In addition, the south would probably contribute shipments of *cotton, phosphates, fruits* and *vegetables,* and *naval stores.*

The importance of *general merchandize* in the probable shipments to northern and eastern points it is impossible to estimate. This group of articles, however, includes the great variety of miscellaneous manufactures produced in cities along the western and southern portions of the waterway and its extensions, such as chemicals, electrical machinery, glass products, carpets, hats, cardboard, brass goods, silk mill products, canned goods, and scrap metals. They now move northward and eastward in very considerable quantities both by rail and steamship lines. The material saving afforded by an inland water route would stimulate the movement of this class of freight to northern and eastern markets.

This conclusion is upheld by the statements of shippers representing many industries. A large Philadelphia shipper via steamship lines writes that 50% of his shipments would probably move through the proposed canal at a saving of 50 cents per ton. A large plaster manufacturer who annually ships from 40,000 to 50,000 tons via the outside route, writes that perhaps 100% would pass through the canal at a saving of 25 cents per ton, or from $10,000 to $12,000 per year, and that his shipments would perhaps increase by 20%. A paint manufacturer of western New Jersey, who now ships about 2,080 tons annually by rail, estimates that 50% would take the canal route, and that shipments would increase 100%. A Philadelphia manufacturer of paper cardboard writes:

"Should the canal be put into practical operation, we can conservatively say that our business with New York City, eastern New York State, covering such points as can be reached advantageously by Hudson River, and New England seaports, would be increased from 300% to 500%. One of the principal things which prevents our doing business in the above-named territory is lack of shipping facilities to secure prompt deliveries at a minimum transportation charge." A large New Jersey shipper of canned goods, ketchup, etc., with total present shipments of over 7,700 tons to the leading points adjacent to the canal, estimates that 75% of this traffic would take the canal route at a saving of 80 cents per ton, or $4,672 annually.

A large Philadelphia coal company, which annually ships from 300,000 to 400,000 tons of coal to northern and eastern points via the outside route, writes that 90% of this tonnage would probably take the canal route at a saving of from 10 to 15 cents per ton, or from $40,000 to $60,000 annually, and that its shipments would probably increase 100% as a result of the proposed waterway. A heavy shipper of lime from the lower Delaware writes that about 50% of his present shipments would go through the canal, and that "steam barges would probably increase it from 20,000 to 40,000 tons to New York Harbor. An advantage would be to deliver the material either up the Hudson or East River via barge without extra handling or lighterage charges as at present." A Philadelphia lumber dealer writes: "If the canal between here and New York is enlarged and made free much of the lumber from the inland waters of Virginia and North Carolina will no longer be forced upon Washington, Baltimore and Philadelphia, but will be sold to much better advantage because the market for it will be enlarged so greatly. The development of new business would immediately become possible."

Similar estimates of probable traffic have also been received from shippers and receivers of brick and tile, railroad ties, wood and wood pulp, shingles, piling, brass goods, glass bottles and jars, quartz, stoves, ranges, furnaces and boilers, hardware and machinery, pottery, leather, cotton mill products, agricultural products, iced fish, silk mill products, dyewoods, metals, coke, iron pipe and foundry products, railroad cars knocked down and boxed for export via New York, boats for New York and beyond, granite, fertilizers, straw and straw goods, mill and feed products, tar and oil, and other articles, at points ranging from Trenton to North Carolina points.

IX. PROBABLE SHIPMENTS FROM NEW YORK BAY AND NEW ENGLAND POINTS

Present shipments of bulky products from points on New York Bay and on the New England coast to canal points southward are less numerous than those moving in the opposite direction. There is, however, a considerable movement of *pottery, brick, tile and terra cotta, structural iron, slaughter house refuse, manure, stone, salt, paper and hides.* A very considerable tonnage would be offered the proposed waterway by these commodities. Hides, for instance, are needed on a large scale at Wilmington, Delaware. At present many are collected at New York from Argentina, and there trans-shipped by rail. It is believed that trans-shipments to Wilmington would be made by water if an inland waterway were provided to make barges available at the side of the ocean-going steamships in New York Harbor.

The shipments of bulky products would be further swelled by the existing truck farming industry adjacent to the route of the canal, and that which is likely to be built up by the canal in the future.

It is further anticipated that certain quantities of *Erie and Champlain Canal freight* would be shipped southward through the proposed waterway. In 1906 the Superintendent of Public Works of New York reported that in their present unimproved condition the canals of New York handled 3,540,000 tons of freight. 1,006,000 tons of this was through freight; and 953,000 tons moved as far as New York City. The main items in the through business are grain, lumber, stone, lime and clay, ice, iron ore and pig iron, and general merchandise. Upon the completion of the improvements now under way on the Erie Canal, it is probable that greater amounts of grain will move eastward from Buffalo, and that considerable quantities would reach Philadelphia in that way were the proposed New Jersey canal constructed. A prominent Philadelphia iron and steel manufacturer has predicted that the proposed canal would enable the iron interests of Delaware Bay to obtain iron ore by way of the Erie Canal direct from Lake Superior in competition with imported Cuban ore, to the benefit of the entire industry of this district. It is probable that considerable quantities of stone, ice and salt would likewise move to Philadelphia and adjacent points from Erie Canal territory.

A large share of the present shipments from New York and New England points southward consist of *package freight,* including general merchandise and manufactures of many kinds. Some of this freight would doubtless move by way of the proposed canal both on barges and steamers. A study of the production of these classified products and their markets emphasizes the possibility of heavier shipments to coastwise points than are at present made. This is particularly true of clothing, boots and shoes, tobacco manufactures, flour, furniture, sugar and molasses.

Certain quantities of freight, such as *New Orleans molasses, rice, and other products,* are at present received at Philadelphia and adjacent points by way of New York. It was pointed out to the committee that such freight could more easily and at less expense be transshipped to barges at New York if an inland waterway were provided to make them available. This difficulty, however, has been

largely overcome by the establishment of a New Orleans service to Philadelphia.

Similar to these shipments from New Orleans is the large variety of merchandise imported at Philadelphia from foreign countries via New York, which is the center of many of the ocean steamship lines tapping foreign markets. A material saving would result if many of these "in transit goods" were transhipped to barges instead of railroad cars from the sea-going steamships which carry them to New York harbor.

The statements of a few typical shippers at the northern and eastern termini of the waterway may be pertinent. A Jersey City iron company writes that "If this intra-coastal canal should be opened and established we could give them about 500 tons per year of freight. It would also open up sand and clay banks in the districts where this canal would be cut, and where it is too far to haul from now to the railroads. These veins of sand and clay are very valuable to this vicinity, and would be valuable to us, as we use considerable quantities of these materials." A large New York shipper of coal tar products, now shipping 75,000 tons by water, estimates that 75% would pass through the canal at a saving of 25 cents per ton, and that shipments would increase from 25% to 50%. A South Amboy shipper of terra-cotta and pottery clays estimates that he would ship 20,000 tons through the canal annually at a saving of 15 cents per ton, and that as a result his business would increase 50%. A leather manufacturer of Newark writes: "The dredging of the Passaic River increased our tonnage 100% by water. We feel that the canal would do the same."

The shipment of in transit goods via New York is shown in part in the statement of a large Philadelphia manufacturer of woolen and silk goods and carpets: "It will enable us to get direct shipments from South America and Mediterranean ports. We use largely of wool from these points and could make through freights to this city. A million pounds of wool are now on the way, and we have had to await shipments for two weeks on part of this wool because there were no vessels to Philadelphia. We can always get them to New York, and if we had a ship canal could save from five to seven and a half cents per hundred pounds."

X. EFFECT OF CANAL UPON RAILROAD TRAFFIC

Viewed from another standpoint, the probable traffic of the proposed waterway will come from three sources: (1) The diversion of existing water traffic from the present outside and inland routes, (2) the diversion of railroad traffic, and (3) the creation of new canal traffic.

The first of these is singly of sufficient magnitude to warrant the construction of an inside route. The diversion of but a reasonable percentage of the present tonnage which passes between the ports of the North Atlantic by water would result in a large and growing canal traffic.

The second source is of less importance, though certain quantities chiefly of low class freight would be diverted to the canal. A portion of the prospective shipments of Southern lumber, wood and wood pulp, railroad ties, fertilizers, stone, sand, brick, lime, terra-cotta, gravel, agricultural products, heavy iron and steel products now transported to some extent between these adjacent ports by rail would doubtless be diverted. Many of these low class articles, it should be remembered, are among the least profitable of railroad traffic. Their intrinsic value is so low that the rates which some of them are able to pay are not sufficient to cover the entire cost of handling them by rail. They are at times regarded as profitable traffic if they but yield a surplus over and above operating expenses; and their portion of the fixed charges of the railroad is shifted to articles of higher class which are able to bear higher rates.

In periods of prosperity, moreover, the railroads have shown their inability to handle all available traffic without serious delays. Even under present conditions, as was mentioned above, it is a common complaint among many shippers and consignees that rail shipments are subject to delays which make prompt deliveries impossible. Whatever diversion of heavy freight may result, would enable the railroads more fully to develop their high class traffic which yields the highest relative profits.

The probable package freight tonnage of the proposed canal, above mentioned, would also result in the diversion of some high-class freight from rail carriers. Since such traffic, however, is essentially suited to rail transportation if conducted so as to assure prompt deliveries, the proposed waterway would be chiefly a complement to existing transportation facilities, rather than an antagonist of rail lines. Various railways operate barges and coastwise steamers in connection with their rail lines, and to such of their water equipment as could use the proposed waterway it would be a direct advantage.

The third source, namely the creation of new canal traffic, depends upon the probable expansion of existing industries and the rise of new industries at points adjacent to the canal. The amount of such traffic is problematical, but it is believed that a very considerable percentage of the canal's tonnage would be created in this way. Cheap transportation of the raw materials of industries almost inevitably leads to a growth in business. This would increase the traffic of the railways as well as of the waterway, for as the shipments of raw materials increase, so also grows the tonnage of finished products suitable for rail transportation. A large shipper of coal, iron, ore, pig iron, steel billets, etc., made

the following pertinent statement to the committee: "The history of the Erie Canal shows that the building and maintaining of an adequate canal tends to build up factory communities using coal, lumber, pig iron, etc., and turning out highly finished products—thus furnishing to the railroads an equal tonnage of finished stuff at a much higher class rate, so that the railroad profits largely by the change."

The statements of shippers, above mentioned, many of whom predict a material increase in their business if the canal were constructed, are especially significant in this regard. So too are the probable expansion of the truck farming and clay industries of New Jersey in the sections bordering on the canal. Other new industries may spring up at points adjacent to the canal as the result of the cheaper transportation of the necessary raw materials.

APPENDIX "A"

Opinions of Naval Authorities Upon the Naval Value of the Proposed Canal.

I. Views of REAR-ADMIRAL C. S. SPERRY, U. S. N.

The inland waterways of the Atlantic coast are an important factor in the national defense in several ways. Not only do they afford a secure passage for certain vessels of the navy, but the sounds, particularly, are an outer line of defense, the ditch of the fortress. Submarines, destroyers and torpedo boats, secure in their smooth waters, and able to pass out through occasional passages, readily defended by mines, can drive off an enemy's fleet, and a hostile landing will be impossible.

Several times within the last fifteen years torpedo boats drawing from six and one-half to seven feet, have made the inland passage from Key West to New York Bay, but with more or less difficulty in the region below Norfolk, and with some damage.

Torpedo boats are not large enough to take the sea and attack an enemy to the best advantage at a distance from the coast, and they have been superseded in the building program of the Navy Department by destroyers and submarines. In order that the largest destroyers and submarines built or contemplated may pass freely and safely through the canals and passages, an ultimate depth of about fourteen feet should be considered, and the radius at bends must be very considerable. The torpedo boats which made the inland passage found their greatest obstacle in the sharp bends, and the new destroyers are about 295 feet in length.

Destroyers and submarines, owing to the fatigue of their crews, and to the character of their motive power, can only reach their highest efficiency when operating from a secure and comfortable base, and it is evident that the conditions in this respect are ideal along the greater part of the Atlantic coast if the waterways are adequately improved. As you are aware, the Navy Department has established a complete chain of most efficient wireless stations from Maine to Texas, and the destroyers and patrol vessels being equipped with wireless, as well as the fleet, communication throughout the whole system will be practically instantaneous.

Strategic Value of Inland Waterways Along the Coast Line.

REAR-ADMIRAL GEORGE W. MELVILLE, U. S. N.,
Former Chief of Bureau of Steam Engineering, Navy Department.

I call particular attention, however, to the fact that this same internal route from Long Island Sound to the Capes of Virginia offers us an element of naval strategy whose value it would be very hard to over estimate. Just note that along this route we have the great navy yard at New York, the one at Philadelphia, the great ship yards on the Delaware, the manufacturing facilities of Baltimore, connection with the gun foundry at Washington, the great ship yards at Newport News, and the navy yard at Norfolk. To make this of real value for naval purposes, the depth must be adequate to permit the passage of battleships, which means a present depth of about 30 feet, and possibly at a later date, 35 feet. At present, however, 30 feet would take care of our vessels of deepest draft.

If you will stop to remember one of the chief reasons advanced for the building of the Panama Canal by our country, you will see

the strategic importance of this inland waterway. You all remember the feeling of anxiety throughout the country when the Oregon was on her long trip down the West coast of South America, through the Straits, and up the East coast, before she joined the rest of our fleet. The time necessary to make this circuit of South America is so great, that for the adequate protection of both our coasts a large fleet is necessary. Experts in strategy tell us, however, that with the completion of the Panama Canal a much smaller aggregate number of ships will suffice for adequate defense because vessels can be sent from one ocean to the other in a very short time, thereby enabling the Atlantic fleet to be a real support to the one in the Pacific, and vice versa.

In the case of the inland waterway paralleling our East coast, something of the same sort is true also along somewhat different lines. Let us imagine that in Chesapeake Bay we have a fleet of say sixteen powerful battleships, but just outside, waiting for them to come out, is a hostile fleet of perhaps twenty, or twenty-five equally powerful battleships. At the same time there are perhaps at the League Island Navy Yard five or six battleships just fitting out. Possibly several others are just about being completed at the great ship yards on the Delaware. For these vessels to come out in small squadrons, in the attempt to concentrate, by the external route is to invite disaster, because the enemy's fleet is more powerful than either of the separate squadrons, and in these days every competent naval commander is familiar with Napoleon's famous tactics of dividing the enemy, and beating him in detail. With the inland waterway, it would be perfectly easy for the vessels from the Delaware to get down into the Chesapeake and join the other fleet, making it more powerful than the enemy. I will not attempt to elaborate this argument or to develop it more fully, as I am sure the suggestion which has just been given will enable you to think of numerous situations where a like benefit would be derived. Possibly it is not necessary to mention it, but I do not want you for a moment to think that the idea of providing this internal route is to make of the sand dunes or our Atlantic coast a refuge behind which our fleet is to hide. No one believes more firmly than I that the proper battle line for any navy is the coast line of the enemy, but it is to enable us to get the maximum advantage of our fleet that this scheme is advocated. We are all justly proud of our great naval victory at Santiago, but if any of you had an opportunity of meeting Admiral Cervera, the Spanish Commander, and found what a fine man he was, you could not help a feeling of pity for him in his position at Santiago, bottled up, so that there was no exit, except into our fleet of superior strength, so that he knew perfectly well that when he came out on that Sunday morning in July, it meant annihilation. Suppose that, instead of the one exit where the entire hostile fleet could be concentrated, there had been communication with a number of other bays, from either of which he might have got out, and you will see very thoroughly the tremendous advantage of this internal waterway from the naval standpoint.

I have not laid any stress upon the usefulness of this internal waterway for torpedo vessels and the smaller craft, which would not need such a deep channel, for the reason that while these are essential auxiliaries of a modern fleet, naval men all over the world are now thoroughly agreed that the real fleet consists of the battleships, which are able both to give heavy blows and withstand them. The experience of the last two wars—ours with Spain, and that of Russia against Japan—showed very conclusively that while there is a role for torpedo vessels, it is a very minor one when the battleship fleet is thoroughly disciplined and trained.

The opinions of **REAR-ADMIRAL JAS. M. FORSYTH, U. S. N.**, were expressed as follows in a letter written to Mr. Joel Cook, November 18, 1907:

Shamokin, Pa., November 18, 1907.

MY DEAR FRIEND:

I am much gratified to see your name mentioned as one of the advocates of "Coast Waterways Project." I hope to see you push hard for it, and so link your name with the success of an enterprise that means much to the future of the commerce of our nation. It is truly national; and, if perfected, will be a benefit to the whole country. Nature has so prepared the way that there are really no great engineering difficulties to overcome, and the matter affects so many States and sections that there is the strongest reason that it should have financial aid from the general Government. Every cent that our Government spends to make communication between the sections easy is, in my opinion, wisely expended, tending to make us a homogeneous mass ready to work together. With a canal put across Florida, there is already a system of natural inland waterways along the gulf coasts of Florida, Alabama, Mississippi and Louisiana that can easily make New Orleans the terminus instead of Beaufort, N. C., and we can meet our brothers of the West as they come down the Mississippi with their project. This scheme for an inland waterway along the Atlantic coast has been the dream and desire of every sea-faring man for sixty years; the Lord grant that I may live to see it fairly started for accomplishment. Do not try for too much at first; if you can get a fourteen-foot channel, I trust to the good common sense of the coming American to make it twenty or twenty-five in good time. The healthy competition of water-borne freight would take a lot of the bitterness out of the present feeling toward the monopoly of railroads, and that is what we want. To our navy it would be a boon, enabling us in time of war to shift our torpedo boats and submarines from one port to another, and so keep the enemy guessing. I had one personal experience during the War of the Rebellion that will point the moral. I was a young officer on one of our ships, in the South Atlantic Blockading Squadron, when we were sent by the commander-in-chief with important despatches from Port Royal, S. C., to Nassau Sound and Ogeechee Sound, Ga. They were to warn the blockading vessels there of an expected raid or attack on them from Savannah. We went out of Port Royal into a southeast gale, which became so bad that our small gun-boat could not stand it, and we were forced to take refuge in Tybee Sound, the entrance to Savannah. Our captain was much worried, and finally, studying our charts, found that a light draught boat could get through inside to Nassau and Ogeechee. I volunteered for the service, and in a ten-oared cutter, went through that inside passage, took the despatches to their destination and returned safely to my ship. You see, there is where in their natural condition those inland waterways helped us; how much more they will do it when improved by the enterprise and intelligence of the present generation.

You are working for a meritorious enterprise, and you, as a business man and one who has always been in touch with the commercial interests of your community, cannot fail to see the benefits that must accrue to the general public if you make it a success. I hope you will pardon my addressing you, but my heart is full of this matter, and I want to see it go through. All I have written is in the most friendly spirit to yourself, and I hope you will see it so.

Your old friend,

JAS. M. FORSYTH.
Rear-Admiral U. S. Navy.

Opinions of CAPTAIN RICHMOND P. HOBSON.

Extracts from an address of September 1, 1910, before the Third Annual Convention of the Atlantic Deeper Waterways Association.

COAST LINE INLAND WATERWAYS AND NATIONAL DEFENSE.

Advantages in Time of Peace.

In time of peace the advantages of inland waterways in national defense means a larger establishment and larger return for given outlay of national treasure.

The development of our coastwise inland waterways would contribute materially to lower the cost of construction and of maintenance of our principal coast fortifications, navy yards and naval stations. The saving would be greatest for the establishments distant from the sources of supply of materials, which include the great plants of the New York and New England groups.

To illustrate how great the saving would be, it is sufficient to cite the large quantities of heavy materials constantly required by the Government, on which the transportation charges would be more than cut in half, such as guns, armor, fuel, ammunition, machinery, structural steel, cement and other heavy materials used in the construction, repair or equipment of forts, naval stations and ships.

The cheaper transportation would stimulate our commercial establishments to compete in supplying war materials for the world's markets, and the enlargement of these establishments would be a great asset in national defense. In addition, the inland waterways would enable our frail vessels to escape the rigors of the sea in being transferred from one station to another.

At the present time the bulk of the above advantages for existing establishments would be realized through inland waterways extending from Norfolk to Boston. It should be pointed out, however, that the opening of the Panama Canal will make the Carribean Sea and Gulf of Mexico the center of distribution of the world. The development of the iron and coal fields of Alabama on a river already navigable to tide water will not only create new establishments for building ships and manufacturing war materials on the Gulf, but will make a new source of supply of structural materials for the older establishments on the Atlantic proper. Furthermore, the Mississippi River will pour a great commerce into the Gulf on its way to the Pacific and to the markets of the world. Therefore the plan for the development of our inland waterways should carry improvements on all the systems at the same time.

Advantages in Time of War.

As great as would be the advantages of our inland waterways in years of peace, their greatest advantages would come in time of war.

The wonderful development of transportation in recent years has brought every important nation within striking distance of all other nations, and at the same time has multiplied the magnitude and swiftness of war operations, so that modern wars have become substantially a test of the military preparations of the belligerents, and not of their resources. All of these developments have worked to the disavantage of America. All other nations have leaped to arms, have organized their whole population into armies, and have taxed their finances upon their fleets, policies that weaken their resources, but increase enormously their preparations.

America alone has failed to organize her people into armies and has given but scant thought to her navy. Though our re-

sources are relatively boundless, our preparations are woefully inferior, and a short war, testing only preparations, would leave us in humilation and defeat. Therefore, our main objective in an important war must be to gain time and bring our resources into play. The enemy's objective on the contrary will be to strike a staggering blow at once before our resources are brought to bear, seize our commercial centers, destroy our navy yards and shipyards and bring us to terms quickly. If we bring our resources to bear we win, if we fail, we lose the war.

Whether we succeed in gaining our main objective will depend more upon our inland waterways than upon any other factor.

Conclusions.

The conclusions to draw from even this very incomplete examination, are simple and clear.

1. That our coastwise inland waterways next to our fleet itself can be made the most vital factor of national defense.

2. That the services of these waterways increase with the nation's peril. They are useful for economy and for building up plants in time of peace; they would always be a source of strength after the national defenses were well provided for. They are now of paramount importance under our present woefully inferior conditions of defense.

3. That in any war under present conditions they would afford our only chance of gaining the time necessary to organize our forces and bring to bear our great resources. They would furnish the only refuge for our inferior fleet, in the face of overwhelming odds without permitting its blockade; they would make it possible for our fleet, though inferior, to give battle after choosing its own time and conditions, and enable it to retire if necessary; they would make it possible to utilize and expand all our establishments for repairing and building ships and to assemble and concentrate ships as fast as ready.

4. That upon our coastwise inland waterways in their relation to the fleet will largely depend the security of our navy yards, shipyards and coast cities and our chance of escaping the knockout blow that will surely be leveled across our poor defenses the instant war is declared.

Summing up, if there were no commercial value to our coastwise inland waterways, their paramount vital importance in national defense would warrant and demand immediate measures on the part of Congress to bring about their full and speedy development.

APPENDIX "B"

The following list of wrecks occurring on the Atlantic and Gulf coasts during the years 1906 to 1910, inclusive, includes only those involving total loss. It consequently does not correspond with Table XXVI, which includes all vessels damaged as well as lost. The vessels named in this Appendix, moreover, include many ships wrecked outside of the zone of the proposed canal's influence. It is submitted, not to show that an intra-coastal canal would have prevented all the losses reported, but to give a specific proof of the great dangers to navigation along the Atlantic and Gulf coasts. It is compiled from the annual reports of the U. S. Commissioner of Navigation.

LIST OF VESSELS LOST.

(Taken from Report of U. S. Com. of Navigation for 1906.)

Rig.	Name of Vessel	Lives Lost	Nature	Date	Place
Schr.	Alice		Stranded	5-7-06	Chincoteague Cove, Va.
"	C. C. Lane		Stranded	3-19-06	Boston, Mass.
"	Charles A. Witler		Collision Schr. John Bossert	8-26-05	Diamond Shoals, N. C.
"	D. Gifford		Stranded	4-10-06	Field Rocks, Mass.
"	Emma L. Cottingham	5	Foundered	6-10-06	Lat. 26 58′ N., Lon. 58 10′ W.
"	Gertrude L. Trundy		Abandoned	9-4-05	Off Thatchers Is., Me.
"	Hamilton Fish		Foundered	3-6-06	Off Barnegat, N. J.
Bkn.	Hattie G. Dixon		Stranded	5-13-06	Chappaquiddick Is., Mass.
Schr.	Ira D. Sturgis		Stranded	2-15-06	Near Indian River, Del.
"	Jennie Sweeney		Foundered	6-14-06	Cape Fear Bar, N. C.
"	Jennie Lockwood		Stranded	2-13-06	Pea Island, N. C.
"	Jesse W. Starr	6	Abandoned	2-27-06	Lat. 37 33′ N., Lon. 74 36′ W.
"	John R. Bergen		Abandoned	3-1-06	Lat. 36 12′ N., Lon. 72 30′ W.
"	John S. Deering		Abandoned	3-5-06	Lat. 37 5′ N., Lon. 71 50′ W.
"	Lizzie Chadwick		Abandoned	3-6-06	Off Cape Hatteras, N. C.
"	Martha E. McCabe		Foundered	3-20-06	Barnegat, N. J.
"	Mary Manning		Abandoned	3-4-06	Lat. 39 N., Lon. 68 W.
"	Nettie Cushing		Stranded	4-13-06	Cornfield Sand Shoal
"	Norumbega		Collision Schr. Edith L. Allen	4-23-06	Fenwick Island, Md.
"	Pendleton Sisters	1	Stranded	12-15-05	Chincoteague, Va.
"	Raymond T. Maull		Stranded	3-21-06	Gull Shoal, N. C.
"	Robert H. Stevenson	12	Stranded	1-13-06	Diamond Shoals, N. C.
"	Samuel L. Russell	5	Foundered	1-8-06	Chesapeake Bay
"	Santiago		Collision S.S. Philadelphia	12-3-06	Off Delaware Breakwater
"	Thomas A. Goddard		Stranded	12-2-05	Nags Head, N. C.
"	Van Name & King	6	Foundered	10-6-05	At Sea
"	W. H. Van Name		Struck submerged Bge. Oak	3-31-06	Hampton Roads, Va.
"	Wm. F. Campbell		Foundered	4-28-06	Off Owlshead, Me.
"	Wm. H. Archer	4	Foundered	9-14-04	En route Bangor, Me., to Vineyard Haven
Str.	Peconic	20	Foundered	8-28-05	Off Fernandina, Fla.

LIST OF VESSELS LOST.

(Taken from Report of U. S. Com. of Navigation for 1907.)

Rig.	Name of Vessel	Lives Lost	Nature	Date	Place
Schr.	A. Heaton.....		Stranded	1-24-07	Outer Brewster Is.
"	A. P. Emerson.....		Foundered	12-3-06	Off Cape Sable, N. S.
"	Adam W. Spies.....		Stranded	12-1-06	40 mi. W of Stirrup Key.
"	Annie L. Henderson...		Burned	9-1-06	Bangor, Me.
"	Arthur C. Wade.....		Stranded	3-26-07	St. Helena Shoals.
"	Asa T. Stowell.....	7	Foundered	9-22-06	From Pensacola, Fla
"	Bala	3	Foundered	2-5-07	Off Atlantic City, N. J.
Bkn.	Bonny Doon.....		Stranded	12-6-06	Stone Horse Shoal, Mass.
Schr.	C. P. Dixon.....	8	Foundered	8-30-06	From Philadelphia
"	Casper Heft.....		Stranded	12-24-06	Smiths Point, Va.
"	Cassie F. Bronson.....		Stranded	9-17-06	Near Cape Fear, N. C.
Bk.	Charles Loring.....		Collided with S.S. Seneca	2-2-07	Off Sandy Hook, N. J.
Schr.	Charles F. Tuttle.....		Abandoned	9-17-06	Charleston, S. C.
"	Charles L. Mitchell...		Abandoned	12-8-06	Off Cape Henry, Va.
"	Chauncey E. Burk....		Stranded	9-6-06	Sandy Point, Abaco.
"	Darby		Foundered	2-5-07	Off Atlantic City, N. J.
"	Ella G. Eells.....	4	Stranded	7-4-06	Libby Island, Me.
"	Everett Webster.....		Abandoned	4-12-07	Off Cape Hatteras.
"	Fannie Reiche.....		Collided with Schr. Martha E. Wallace	12-23-07	Off Winter Quarter Light, Va.
"	Florence I. Lockwood..		Stranded	12-6-06	Chincoteague Inlet, Va.
Bk.	Fluorine		Stranded	9-27-06	Cat Island, Miss.
Schr.	Fred. P. Litchfield....		Foundered	9-26-06	Gulf of Mexico, Lat. 26 N., Lon. 87 50′ W.
"	George V. Jordan.....		Stranded	8-6-06	Pollock Rip Shoals, Mass.
"	Gertrude A. Bartlett..		Abandoned	9-27-06	Lat. 29 15′ N., Lon. 71 45′ W.
"	Harry Knowlton.....		Collided with St. P. Larchmont	2-11-07	Off Watch Hill, R. I.
"	Helen J. Seitz.....		Stranded	2-9-07	Beach Haven, N. J.
"	Helen M. Atwood.....		Stranded	2-18-07	Arenas Bank, P. R.
"	Henry Sutton.....	7	Foundered	10-18-06	From Cheverie, N. S.
"	Horace G. Morse.....	2	Stranded	1-19-07	Bliss Island, N. B.
"	J. F. Whitcomb.....		Stranded	3-24-07	Assateague Beach, Va.
"	James D. Dewell.....	7	Foundered	9-17-06	Off Charleston, S. C.
"	James M. Hall.....		Stranded	11-15-06	Long Beach, N. J.
Bg.	Jennie Hulbert.....		Abandoned Towed into Port Eads, La.	9-21-06	Gulf of Mexico, Oct. 10, 1906
Schr.	Jennie G. Pillsbury...		Stranded	11-27-06	Two-Bush Reef, Penobscot Bay, Me.
"	John C. Gregory.....		Collided with S.S. Ontario	5-4-05	Off Gayhead, Mass.
"	Landseer		Foundered	3-13-07	Off Absecon, N. J.
"	Luis G. Rabel.....		Stranded	11-18-06	Bulls Island, S. C.
"	Marshall Perrin.....	2	Stranded	11-16-07	Wood Island, Me.
"	Matilda D. Borda.....		Stranded	7-16-06	Gull Shoals, N. C.
"	Merom		Stranded	10-13-06	Bonaire, D. W. I.
"	Nelson E. Newbury....	6	Foundered	9-17-06	Off Charleston, S. C.
"	Oliver S. Barrett.....	8	Capsized Sailed from Port Royal for N. Y.	9-9-06	At sea
"	P. T. Barnum.....		Abandoned	9-19-06	30 mi. east of Bodie Is.
"	Pactolus		Foundered	6-2-07	Off Hog Island, Va.
"	Providence		Abandoned	12-3-06	Lat. 34 6′ N., Lon. 74 47′ W.
"	R. D. Bibber		Stranded	7-17-06	Frying Pan Shoals, N. C.
"	Samuel H. Sharp.....		Stranded	1-25-07	Cape May, N. J.
"	Tena A. Cotton.....		Stranded	2-4-07	Ocean City, Md.
"	Twilight	6	Capsized	9-16-06	50 mi. off Charleston
"	William Marshall.....		Stranded	12-8-06	Highland Light, Cape Cod.
"	William D. Becker....		Foundered	4-7-07	Off Barnegat, N. J.
"	William H. Bailey....		Abandoned	3-8-07	Off Cape Hatteras, N. C.

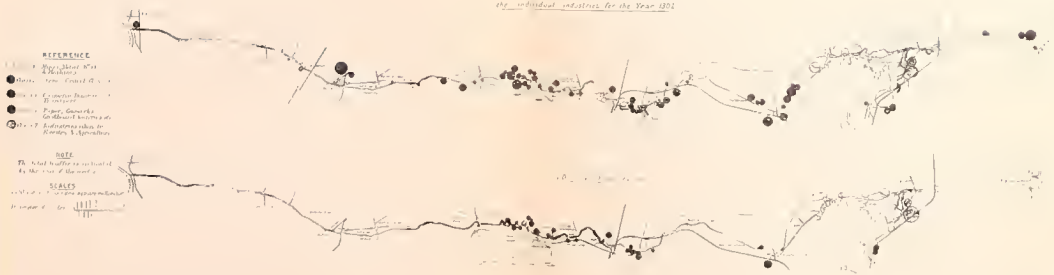
ROYAL COMMISSION ON CANALS AND WATERWAYS.

Map G 18

FOREIGN ENQUIRY

THE INDUSTRIAL DEVELOPMENT ALONG THE FINOW CANAL

Graphical representation of the total traffic of the individual industries for the Year 1902



LIST OF VESSELS LOST.

(Taken from Report of U. S. Com. of Navigation for 1908.)

Rig.	Name of Vessel	Lives Lost	Nature	Date	Place
Bkn.	Addie Morrill.....		Foundered	10-3-07	Cape Hatteras, N. C.
Bk.	Adolph Obrig.....	18	Foundered	4-10-07	Sailed from New York for San Francisco. Not reported
Bgn.	Alcaea	7	Foundered	12-16-07	Sailed from Philadelphia for Martinique. Not reported
Bk.	Baltimore	9	Foundered	1-22-08	Sailed from Hampton Roads for Savannah
Schr.	Cumberland		Foundered	9-24-07	Wolf Point, N. B.
"	David Carrie.....		Foundered	12-20-07	Duck Island, Conn.
"	E. M. Duffield.....		Foundered	1-1-08	Bridgeport, Conn.
Bk.	Edmund Phinney.....		Stranded	12-14-07	Sandy Hook, N. J.
Schr.	Edward J. Berwind....		Abandoned	1-30-08	Lat. 35 24′ N., Lon. 71 58′ W.
"	Emilie E. Birdsall....	3	Collision S. S. Jefferson	2-4-08	Winter Quarter Shoal, Va.
"	Estelle Phinney.....	1	Collided Schr. Elizabeth Palmer	12-27-07	Barnegat, N. J.
"	Fall River.....		Foundered	1-25-08	40 mi. S. W. Block Island
"	Gardiner B. Reynolds..		Foundered	12-5-07	Lat. 36 17′ N., Lon. 78 17′ W.
"	Geo. R. Vreeland.....	7	Foundered	1-27-08	Sailed from Hampton Roads for N. Y. No report
"	H. E. Thompson.....		Stranded	4-8-08	Anegada Is., W. I.
Bk.	H. G. Johnson.....		Stranded	4-14-08	Cumberland Bar, Ga.
Bg.	Havilah		Stranded	11-29-07	Point Garnas, P. R.
Schr.	Helen E. Taft.....		Collided Swedish S. S. Uppland	1-29-08	Cape Lookout, N. C.
"	Helen G. Moseley.....		Abandoned	1-26-08	20 mi. E. Cape Henry
"	Henry A. Litchfield....		Burned	8-12-07	Cape Henry, Va.
"	Howard B. Peck.....		Stranded	2-15-08	Fire Island, N. Y.
Schr.	Jesse Barlow		Collided S. S. Lehigh	12-17-07	Pollock Rip, Mass.
"	John E. Deevlin.....		Stranded	1-10-08	Metomkin, Va.
"	Jonathan Sawyer.....		Stranded	11-6-07	Cape Porpoise, Me.
"	Josephone Ellicott.....	7	Foundered	1-9-08	Sailed from New York for Mayport, Fla.
"	Leonora	5	Stranded	1-8-08	Diamond Shoals, Cape Hatteras, N. C.
"	Mary L. Newhall.....		Foundered	1-14-08	200 mi. N. of Bermuda
"	Matanzas		Stranded	1-27-08	Montaul, L. I., N. Y.
"	Melrose		Stranded	2-15-08	Cape Hatteras, N. C.
"	Mollie S. Look.....		Stranded	2-13-08	Hillsboro Inlet, N. C.
"	New York.....		Foundered	10-23-07	15 mi. S. W. Montauk Point, Long Island
"	Nimbus		Foundered	12-15-07	Lat. 33 15′ N., Lon. 74 50′ W.
"	Number Twenty-six...		Foundered	11-25-07	Barnegat, N. J.
"	Orient		Stranded	4-18-08	Cape Lookout, N. C.
"	Pardon G. Thomson...		Stranded	7-26-07	Grand Manan Is., N. B.
"	Rebecca Shepherd.....		Stranded	12-4-07	Pollock Rip Shoal, Mass.
Bkn.	Rose Innes.....		Stranded	10-30-07	St. Simons Is., Ga.
Schr.	S. S. Hudson.....		Burned	8-29-07	S. E. of Little Hope, N. S.
"	T. Charlton Henry....		Collided Br. S. S. Chelston	6-23-07	Fire Island, N. Y.
"	Thomas A. Ward.....		Burned	12-6-07	Lat. 32 5′ N., Lon. 77 48′ W.
"	White Band.....	6	Foundered	1-24-08	Cape Henlopen, Del.
"	Wm. H. Skinner.....		Abandoned	2-15-08	45 mi. E.N.E. of Frying Pan Shoals, N. C.
Schr.	William L. Walker....		Foundered	10-29-07	40 mi. S. Cape Lookout
Str.	Bluefields	18	Foundered	1-4-08	Cape Hatteras, N. C.
"	City of Birmingham...		Foundered	11-4-07	Castle Island, Boston Bay, Mass.

LIST OF VESSELS LOST.

(Taken from Report of U. S. Com. of Navigation for 1909.)

Rig.	Name of Vessel	Lives Lost	Nature	Date	Place
Schr.	Adeline Townsend.....	6	Collision	1-12-09	Cape Henlopen, Del.
"	Alice T. Bordman.....	1	Stranded	1-4-07	Handkerchief Shoal, Mass.
"	Arleville H. Peary....		Stranded	10-31-08	False Cape, Va.
Schr.	Auburndale	10	Foundered	7-24-08	Sailed from Turks Is. for Phila. Not reported
Schr.	Belle O'Neill.....		Foundered	2-4-09	Cape Lookout Shoals, N. C.
"	Benj. C. Firth.....		Foundered	6-28-09	Martins Industry Shoal, N. C.
"	Beulah McCabe.....	7	Foundered	9-15-08	Bahama Islands
"	Charley Woolsey.....		Collided	7-25-08	Cornfield Light, Conn.
"	Dessoug		Foundered	10-21-08	17 mi. N. E. Winter Quarter Shoal, Va.
"	Elvira Ball.....		Abandoned	2-8-09	130 mi. E. of Cape Charles, Va.
Slp.	Eugenia A. Eley.....	2	Capsized	1-6-09	Chesapeake Bay
Schr.	Flora Rogers.....		Stranded	10-23-08	Bodys Island, N. C.
"	Florence Shay.....	2	Stranded	11-12-08	Virginia Beach, Va.
"	Gilberton		Foundered	9-16-08	Brown Shoal, Del.
"	Harry Messer.....		Stranded	12-24-08	Handkerchief Shoal, Mass.
"	Hattie M. Graham.....		Stranded	6-15-09	Bouline, Cape Breton
"	Henry Clauson, Jr.....		Abandoned	11-6-08	En route Gulfport, Miss., to Michaels, Azores
"	Henry Wolcott.....		Foundered	8-20-08	Brooklyn, N. Y.
"	Horace P. Shares.....		Abandoned	2-1-09	Lat. 35 32′ N., Lon. 73 48′ W.
"	Horace W. Macomber..		Stranded	11-24-08	Moselle Shoal, Abaca, Bahamas
Schr.	Howard Compton.....		Abandoned	11-6-08	Lat. 35 38′ N., Lon. 73 40′ W.
"	Independent	5	Foundered	11-14-08	Hog Island, Va.
"	Jeanie Lippitt.....	7	Stranded	12-22-08	Winter Quarter Shoal
"	Jennie Thomas.....		Abandoned	11-16-08	300 mi. E. of Sandy Hook
"	Jennie French Potter..		Stranded	5-18-09	Vineyard Sound, Mass.
Bg.	John McDermott.....	7	Foundered	9-5-08	Sailed from N. Y. for Fajardo, P. R. No report
Schr.	John A. Matheson.....		Abandoned	9-15-08	Lat. 26 26′ N., Lon. 70 5′ W.
"	John M. Brown.....		Foundered	10-30-08	Lat. 37 N., Lon. 71 W.
"	Jose Olaverri.....		Stranded	7-23-08	Bull Island, S. C.
"	Joseph B. Thomas.....		Stranded	3-21-09	Fowey Rocks, Fla.
"	Julia Baker.....		Stranded	2-1-08	Millbridge, Me.
"	Lulie L. Pollard.....		Burned	10-31-08	Lat. 35 30′ N., Lon. 74 10′ W.
"	Marie F. Cummins....		Stranded	11-14-08	12 mi. S. Delaware Breakwater, Del.
"	Mary Sanford.....		Abandoned	1-31-09	Lat. 38 N., Lon. 65 W.
"	Mary B. Judge.....	1	Abandoned	9-14-08	Lat. 26 18′ N., Lon. 71 W.
"	Miles M. Merry.....		Stranded	2-17-09	Moriches, N. Y.
"	Myra W. Spear.....	3	Foundered	12-28-08	20 mi. W. Highland Light
"	L. R. D. Spear.....		Foundered	11-3-08	250 mi. north of Bermuda
"	Rebecca W. Huddell...		Stranded	4-22-09	East Liberty Is., Me.
"	Sarrah W. Lawrence...		Stranded	2-10-09	Cape Henlopen, Del.
Bkn.	Shawmut		Stranded	12-1-08	Yellowhead Is.
Schr.	William Neely.....	8	Foundered	12-20-08	Carteret, N. J., for Savannah. No report
"	Wm. C. Carnegie.....		Stranded	5-1-09	Moriches, N. Y.
"	Wm. C. Tanner.....	10	Foundered	12-25-09	Rockport, Mass., for Key West, Fla.
"	Wm. H. Conner.....		Collided Schr. Hugh Kelly	4-22-09	Sandy Hook, N. J.
"	Wm. J. Lormond.....		Foundered	12-22-08	Currituck Beach, N. C.

LIST OF VESSELS LOST.

(Taken from Report of U. S. Com. of Navigation for 1910.)

Rig.	Name of Vessel	Lives Lost	Nature	Date	Place
Schr.	Abel C. Buckley.....		Abandoned	1-1-10	Lat. 35 43′ N., Lon. 59 42′ W.
"	Alice E. Clark.....		Stranded	7-1-09	Long Island Ledge, Penobscot Bay, Me.
"	Anna R. Bishop.....	7	Foundered	12-25-09	Jacksonville for Elizabethport, N. J.
"	Arlington		Stranded	8-17-09	Long Beach
"	Auburn	9	Foundered	12-23-09	Jacksonville for Phila.
"	Asbury Fountain.....		Wrecked	3-3-10	Winter Quarter Shoals
"	Anna R. Bishop.....		Abandoned	7-19-10	At sea, 50° N., 24° W.
"	Ada Ames.....		Sunk	8-30-10	Off Chatham
"	Abbie G. Cole.....		Wrecked	12-16-10	Boston Bay, Mass.
Slp.	Ben Franklin.....		Stranded	11-9-09	Sandwich, Mass.
Bge.	Bristol		Sunk	9-4-10	Off Sandy Hook, N. J.
Schr.	Belle Halladay.....		Sunk Collision	12-14-10	Near Vineyard Haven
"	Charles J. Willard....		Struck Wreck	9-18-09	Vineyard Sound, Mass.
"	City of Montreal.....		Stranded	11-27-09	Plymouth Bay, Mass.
"	Carrie A. Norton.....		Wrecked	2-6-10	False Cape, Va.
"	Catherine M. Monahan.		Abandoned	8-24-10	Cape Hatteras
"	Cox and Green.....		Foundered	11-10	Lat. 39 N., Lon. 59 W.
"	Davis Palmer.....	14	Foundered	12-26-09	Boston Harbor
Bge.	Doris		Sunk	2-28-10	Providence
Schr.	Edgar C. Ross.....		Abandoned	1-13-10	Lat. 40 54′ N., Lon. 52 51′ W.
"	Eleazer W. Clark.....		Stranded	11-16-09	Frying Pan Shoals, N. C.
"	Eugene Borda.....		Abandoned	12-2-09	Lat. 40 20′ N., Lon. 68 34′ W.
Schr.	Edith Olcott.....		Abandoned	8-19-10	At sea, 37 N., 65 W.
"	Edward T. Stotesbury.		Wrecked	10-20-10	Florida Keys
"	Emily Baxter.....		Wrecked	11-25-10	Fire Island
"	Frances	8	Stranded	2-1-10	Cape Hatteras, N. C.
"	Florence Leland.....		Abandoned	10-16-10	Lat. 40 N., Lon. 64 W.
"	Frank T. Stinson.....		Burned	11-30-10	At Porto Rico
"	Gatherer		Foundered	11-29-09	Assateague, Va.
"	George Taulane, Jr....	7	Foundered	9-18-09	Belfast, Ga., for Phila.
"	George A. McFadden..		Stranded	1-27-10	Diamond Shoals, N. C.
"	Geo. F. Phillips.....		Abandoned	2-5-10	Lat. 33 25′ N., Lon. 73 40′ W.
"	Georgie L. Drake.....		Abandoned	12-31-09	Lat. 35 5′ N., Lon. 71 47′ W.
Bkn.	Good News.....		Abandoned	6-3-10	Lat. 29 42′ N., Lon. 74 26′ W.
Schr.	Governor Ames.....	11	Stranded	12-13-09	Wimble Shoals, N. C.
"	Gracie D. Buchanan...		Wrecked	2-11-10	Near Jacksonville
"	George Churchman.....		Wrecked	4-10	Parreboro
"	Geo. E. Prescott.....		Wrecked	2-10	Near Gloucester
"	Henry B. Fiske.....	8	Stranded	12-23-10	Nantucket, Mass.
"	Harry C. Shepherd....		Sunk	1-10-10	Near Cape Cod
"	Henry L. Peckhan....		Burned	6-29-10	Richmond, Me.
"	Harry K. Fooks.....	5	Abandoned	10-10	Gulf of Mexico
"	Harry T. Hayward....	3	Wrecked	10-10	Bahamas
"	Hazel Dell.....		Sunk	12-9-10	Off Rockport
"	J. S. Hoskins.....		Abandoned	2-8-10	Lat. 31 32′ N., Lon. 69 30′ W.
Schr.	J. Henry Edmunds....		Collided S. S. Wm. H. Taylor	2-1-10	Sandy Hook, N. J.
"	James Boyce.....		Stranded	10-10-10	Mussel Ridge Channel, Me.
"	Jennie N .Huddell.....		Stranded	2-4-10	Carters Shoal, Chincoteague, Va.
"	John Proctor.....		Stranded	9-13-09	Cape Henlopen, Del.
"	John A. Briggs.....	6	Foundered	12-26-09	Off Barnegat, N. J.
"	Julia P. Cole.....		Foundered	1-21-10	Off Hatteras
"	John Cadwallader.....		Wrecked	11-22-10	Near Portland, Me.
Bge.	Baroness		Sunk Collision	11-15-10	Fire Island
Schr.	Lucy E. Friend.....		Abandoned	11-14-10	Winter Quarter
"	L. O .C. Wishart.....		Wrecked	12-5-10	Little Egg Harbor
"	Maggie S. Hart.....	8	Foundered	12-18-09	Jacksonville for New York
"	Marie Palmer.....		Stranded	12-17-09	Frying Pan Shoals, N. C.

List of Vessels Lost, 1910.—Continued.

Rig.	Name of Vessel	Lives Lost	Nature	Date	Place
Schr.	Martha S. Bennett....	7	Foundered	12-16-09	Jacksonville for New York
"	Merrill C. Hart.....	5	Collided Br. Bk. John S. Bennett	11-7-09	Off Block Island, R. I.
"	Mertie B. Crowley....		Stranded	1-23-10	Wasque Shoal, Nantucket Sound, Mass.
"	M. L. Wetherill.....		Wrecked	1-13-10	Near Newburyport
"	Mary J. Russell.....		Abandoned	2-3-10	Lat. 29 N., Lon. 73 W.
"	Maud Seward.....		Wrecked	1-10	Tilsbury, Mass.
"	Marcus Edwards.....	5	Missing		
Bge.	Maywood		Sunk	12-16-10	Off Cape Cod
Schr.	Martha E. Wallace....		Wrecked	12-21-10	Coast North Carolina
"	Mollie Rhodes.....	5	Wrecked	12-15-10	Off Chatham
"	Nantasket		Stranded	12-25-09	Scituate, Mass.
Schr.	Nettie Champion.....		Abandoned	12-27-09	Lat. 38 N., Lon. 70 W.
"	Nettie B. Dobbin.....		Abandoned	4-28-10	Off Nantucket, Mass.
"	Norombega		Collided	6-16-10	Off Fire Island
"	Nat Ayer.....		Wrecked	10-21-10	Boston Bay
"	Perkasie		Foundered	7-8-09	Off Barnegat, N. J.
"	Robert C. McQuillen...	7	Foundered	12-19-09	Mystic, Conn., for Charleston
"	Rosa Mueller.....		Burned	7-29-09	Brewer, Me.
"	S. M. Bird.....		Stranded	1-10-10	Pollock Rip Slue, Mass.
"	Shawmont	5	Foundered	8-17-09	Off Shinnecock, N. Y.
"	Shenandoah		Collided	10-29-09	Nantucket Sound, Mass.
Bge.	Sunbury		Sunk	8-18-10	Off Cape Henlopen
"	Scranton		Sunk	12-18-10	Off Cape Cod
Schr.	Theresa Wolf.....		Foundered	10-16-09	15 mi. S. W. Seguin, Me.
"	Thomas G. Smith.....		Stranded	4-10-10	Core Bank, N. C.
"	Thomas B. Garland....		Wrecked	12-16-10	Nantucket
"	West Virginia.....		Foundered	9-29-09	Pollock Rip Slue, Mass.
"	Wm. P. Palmer.....		Wrecked	9-30-10	Near Vineyard Haven
"	William W. Converse..	3	Wrecked	10-20-10	Florida Coast
"	Wm. E. Bowen, Jr....		Sunk Collision	11-30-10	Off Bermuda
"	Wm. H. Davidson.....		Wrecked	12-12-10	Coast North Carolina
"	Young Brothers.....		Burned	6-29-10	Richmond, Me.

APPENDIX "C"

Estimated Reduction in Freight Rates Resulting from Proposed Canal.

Philadelphia.

March 7, 1911.

MR. WILFRED H. SCHOFF, c/o Commercial Museum, Philadelphia.

DEAR MR. SCHOFF:

Referring to your esteemed favor of February 6th, 1911, relating particularly to a comparison or estimate of the freight charge on transportation of merchandise between New York and Philadelphia, over three mediums, namely, first, by rail; second, by Delaware & Raritan Canal, as at present operated, and third, by modern barges of large capacity, such as could be operated through a free public waterway of the sort planned in Colonel Black's survey.

From data which we have compiled, and from discussions of the general subject with numerous experts and practical men, we are satisfied that merchandise of the classes and descriptions generally moving or likely to move between Philadelphia and New York (this excludes packages of exceptionally heavy weight and extra hazardous character of merchandise) should be handled through the free ship canal in barges at a freight transportation rate of not exceeding respectively 35c and 45c per ton of 2,000 lbs. We believe that with modern, up-to-date facilities for handling the merchandise into and out of the barges, same could be performed at a cost of not exceeding 10c for loading and 15c for discharging per ton.

The foregoing would naturally involve commodious economic terminals and availing of the cheapest, best methods of loading and unloading the merchandise.

You will be kind enough to note from enclosed statements (A and B) that we have only provided for the barges being loaded respectively 60% and 75% of full capacity. If they were run full of cargo—say the 1,000-ton barge with 1,000 tons, and the 2,000-ton barge with 2,000 tons of cargo—you can readily see that it would increase their annual earning capacity very materially, with no considerable increase in their fixed charges.

More and more it becomes a question of terminal facilities constructed on the broadest, largest and most comprehensive basis which, among other conditions, would involve always having suitable working berths ready for barges when and as they might arrive, with a system which would involve their commencing to discharge or load within an half hour of the time of their arrival in port. This question of despatch we are lamentably deficient in our appreciation of all along the Atlantic seaboard. Very much so at Philadelphia. Only last week we had occasion to send one of our young men aboard a steamer that was proceeding to Newport News, where the vessel went to receive over 1,000 tons of bunker coals. We are informed that the steamer arrived at Newport News at 8 P. M. on Sunday, and at 9 P. M. the same evening her bunker coals were being put aboard direct from the coal trestles, and she completed loading her 1,000 tons of coal late Monday afternoon, sailing, we believe, at daylight on Tuesday, if not on Monday. Another illustration is recorded in a letter from our New York Manager, of the ordinary despatch prevailing at Norfolk and New-

port News in the loading of cargo coal, in his letter of recent date, which reads as follows:

> "Steamer 'G'—4,000 tons cargo—although this boat only went on time charter at Norfolk at 10 A. M. Saturday, February 25th, the Captain writes us that it was loaded 1 A. M. Sunday, the 26th, and sailed at 7 A. M. same day (Sunday) for Trinidad.
>
> "Steamer 'W'—6,500 tons cargo—This vessel received quick despatch, arriving at Newport News on Thursday, February 23d, and sailed on Saturday, February 25th, fully loaded."

One of the phenomenal economies that we believe will subsequently be introduced through one or more mediums by railroad companies will be despatch in unloading and reloading their cars, and the consequent immense increase in the earning capacity of their car equipment.

You doubtless appreciate that the modren barges that may be constructed hereafter will be able to avail of all mechanical devices for facilitating the handling of cargo, as they would be built with their hatches at least something like those performing services on the Great Lakes, and into which discharging and other machinery could be introduced with the greatest freedom and resultant efficiency.

Yours very respectfully,

(Signed) FRANK L. NEALL.

EXHIBITS.

1. Comparative summary of rates between Philadelphia and New York via all rail and Delaware & Raritan Canal, and proposed free ship canal. Also class rates between New York and Philadelphia, with their added respective equivalents in tons of 2,000 lbs. All rail, Clyde Line (outside), Delaware & Raritan Canal, and proposed ship canal.
2. Class rates between Philadelphia, New York, Baltimore, etc., and illustrations of standard articles covered under the different railway classifications. General data on coke and coal and certain specified merchandise.
3. Freight rates and Delaware & Raritan Canal tolls between Philadelphia and New York, on sundry commodities as mentioned.
4. Freight rates—Ericsson Line—Chesapeake & Delaware Canal, also tolls, between Philadelphia and Baltimore, on sundry commodities as mentioned.

1. COMPARATIVE SUMMARY OF RATES BETWEEN PHILADELPHIA AND NEW YORK VIA RAIL AND DELAWARE & RARITAN CANAL, AND PROPOSED FREE SHIP CANAL.

	All Rail	Delaware & Raritan Canal	Proposed Free Ship Canal	
			1000-ton Barges	2000-ton Barges
Machinery	$4.40	$1.80	45c	35c
Lumber	2.40	1.60	45c	35c
Hay	2.10	1.80	45c	35c
Roofing Paper	2.10	1.80	45c	35c
Hides (Green)	2.10	1.80	45c	35c
Oilcake	1.90	1.60	45c	35c
Fertilizer	1.90	1.60	45c	35c
Cotton	2.40	....	45c	35c
Sugar (L. C. L.)	2.10	1.80	45c	35c
Manure	1.00	1.60	45c	35c
Sand	1.60	....	45c	35c
Sugar (C. L.)	1.70	....	45c	35c

NOTE.—Above rates computed on basis of ton of 2,000 lbs.

⊗Includes tolls.

NOTE.—Estimated respective rates of forty-five cents (45c) and thirty-five cents (35c) per ton of 2,000 lbs. is determined upon as being reasonable upon any and all ordinary traffic between New York and Philadelphia, via a free ship canal across New Jersey.

EXHIBIT "A."

1. Barges of 1,000 tons capacity could be used.
2. These barges should be enabled to make 13 round trips in a single year, between Philadelphia and New York.
3. Averaging 75% of capacity cargo, a single barge would carry 19,500 tons in 1 year.
4. 19,500 tons, at 45c per 2,000 lbs., would give a gross revenue of $8,775. This upon a single barge costing $15,000.
5. Insurance at 3% upon such a barge would be $450 per year.
6. Wages of a crew of 3 men and the feeding of crew would cost not exceeding $1,500 per year.
7. The repairs to the barge would be $500 a year.
8. The cost of towage would amount to $2,340 per year.
9. Estimated depreciation for each year upon a basis of 20 years, would be $500 per year.
10. Interest upon $15,000 at 6% per annum would be $900.
11. The total cost of the investment per year, wages, insurance, maintenance, depreciation, towage, etc., amounts to $6,190, leaving a profit of $2,585, or 17 2-10% upon the investment.
12. 17 2-10%, plus 6% upon the investment, equals 23 2-10%—a fair rate of return, that creates a rate (based upon the lowest class rates, $1.90 per ton of 2,000 lbs.—sixth class) for transportation of only 24% of the present all rail rate, and 28% of the canal rate (based upon the lowest class rate, $1.60 per ton of 2,000 lbs.—sixth class) via the Delaware & Raritan Canal. The quoted rate on Delaware & Raritan Canal includes tolls—the proposed canal would be a free public waterway.

EXHIBIT "B."

1. Barges of 2,000 tons capacity could be used.
2. These barges should be enabled to make 13 round trips in a single year between Philadelphia and New York.
3. Averaging 60% of capacity cargo, a single barge would carry 31,200 tons in 1 year.
4. 31,200 tons at 35c per 2,000 lbs. would give a gross revenue of $10,920. This upon a single barge costing $23,000.
5. Insurance at 3 per cent. upon such a barge would be $690 per year.
6. Wages of a crew of 3 men and the feeding of crew would cost not exceeding $1,600 per year.
7. The repairs of the barge would be $760 a year.
8. The cost of towage would amount to $2,340 per year.
9. Estimated depreciation for each year, upon a basis of 20 years, would be $750 per year.
10. Interest upon 23,000 at 6% per annum would be $1,380.
11. The total cost of the investment per year—wages, insurance, maintenance, depreciation, towage, etc., amounts to $7,520, leaving a profit of $3,400, or 14 8-10% upon the investment.
12. 14 8-10 %, plus 6% upon the investment, equals 20 8-10%—a fair rate of return that creates a rate (based upon the lowest class rate, $1.90 per ton of 2,000 lbs.—sixth class) for transportation of only 18% of the present all rail rate, and 22% of the canal rate (based upon the lowest class rate, $1.60 per ton of 2,000 lbs.—sixth class) via the Delaware & Raritan Canal. The quoted rate on

Delaware & Raritan Canal includes tolls—the proposed canal would be a free public waterway.

For the purposes of comparison, the all rail class rates between New York and Philadelphia are added with their equivalents in tons of 2,000 lbs.

	1	*2*	*3*	*4*	*5*	*6*
Class Rates per 100 lbs. (cents)	22	18	15	12	10½	9½
Class Rates per 2,000 lbs. "	440	360	300	240	210	190

Rates via Clyde Line Steamers (outside):

	1	*2*	*3*	*4*	*5*	*6*
Class Rates per 100 lbs. (cents)	18½	14½	12½	10	9	8
Class Rates per 2,000 lbs. "	370	290	250	200	180	160

Rates via Clyde Line, via Delaware and Raritan Canal at present not in effect, as no boats of this line are operated through the canal:

	1	*2*	*3*	*4*	*5*	*6*
Class Rates per 100 lbs. (cents)	18	14	12	10	9	8
Class Rates per 2,000 lbs. "	360	280	240	200	180	160

Rates via proposed ship canal—(1,000 ton barge basis):

	1	*2*	*3*	*4*	*5*	*6*
Class Rates per 100 lbs. (cents)	2¼	2¼	2¼	2¼	2¼	2¼
Class Rates per 2,000 lbs. "	45	45	45	45	45	45

Rates via proposed ship canal—(2,000 ton barge basis):

	1	*2*	*3*	*4*	*5*	*6*
Class Rates per 100 lbs. (cents)	1¾	1¾	1¾	1¾	1¾	1¾
Class Rates per 2,000 lbs. "	35	35	35	35	35	35

APPENDIX "D"

2. REPRESENTATIVE CLASS AND COMMODITY RATES BETWEEN NEW YORK, PHILADELPHIA AND BALTIMORE.

	1	*2*	*3*	*4*	*5*	*6*
Class Rates *between* NEW YORK and PHILADELPHIA.....	22	18	15	12	10½	9½
Class Rates *between* NEW YORK and BALTIMORE	34	29	23	18	15	12
Class Rates *between* PHILADELPHIA and BALTIMORE..	23	20	18	12	10	9

(Rates apply via Pennsylvania Railroad.)

Articles are classified as follows (Illustrations):

First Class.

Boots and Shoes
Loose Leather
Clothing
Machinery
Drugs (L. C. L.)
Knit Goods
Liquor (L. C. L.)
Drygoods
Dressed Meats
Silks
Tea
Agricultural Implements
Candy (L. C. L.))

Second Class.

Butter (in wood))
Leather (in bdls.)
Dressed Hogs
Cotton Waste (uncomp.)

Third Class.

Drugs (C. L.)
Candy (C. L.)
Rope (L. C. L.)
Liquor (C. L.)
Condensed Milk (in cans, boxed) (L. C. L.)
Babbitt Metal (L. C. L.)
Petroleum and (Iron drums)
Petroleum Products (of bbls. L. C. L.)
Oysters (in bulk) (C. L.)
Oysters (in bags) (L. C. L..)

Fourth Class.

Cotton (compressed bales)
Wood Shingles (L. C. L.)
Fertilizers (L. C. L.)
Nails
Spikes (L. C. L.)
Terra-cotta Drain Pipe
Sewer Pipe (L. C. L.)
Sand (L. C. L.)
Curbing, Flagging, Paving Stone (L. C. L.)
Cotton Waste (comp.)
Lime (bags, bbls., casks or drums) (L. C. L.)

Fifth Class.

Petroleum and Products (C. L.)
Rope (C. L.)
Shovels (C. L.)
Marble (polished) (C. L.)
Granite (polished) (C. L.)
Oilcake (L. C. L.)
Agricultural Implements (C. L.)
Feed (L. C. L.)
Oats (L. C. L.)
Barley (L. C. L.)

Sixth Class.

Sand (C. L.)
Wood Shingles (C. L.)
Oilcake (C. L.))
Fertilizers (C. L.)
Lime (bags) (C. L.)
Curbing, Flagging, Paving Stone (C. L.)
Oats (C. L.)
Marble, Granite (rough) (C. L.)
Sewer Pipe (C. L.)
Feed (C. L.)
Barley (C. L.)

Rates on Coke, in carloads, from Connellsville and Klondike regions, to

Baltimore	(1)	$2.15 per 2,000 lbs.
Philadelphia	(1)	2.15 " " "
New York		2.85 " " "
Boston	(2)	3.50 " " "

(1) Includes dumping from cars to vessels when for transhipment by water.
(2) Includes switching charges of B. & A. R. R. when not in excess of 30c.

Rates on Bituminous Coal, to Baltimore and Philadelphia, New York and Boston, from

	Baltimore	*Philadelphia*	*New York*	*Boston* (1)
District 1	$1.60	$1.60	$1.95	$2.60
" 2	1.85	1.85	2.20	2.85
" 3	2.00	2.00	....	3.00
" 4	1.85	1.85	2.20	2.85
" 5	1.85	1.85	2.20	2.85

District 1—Cumberland-Piedmont.
" 2—Connellsville of P. & Y.
" 3—Finleyville of P. & Y.
" 4—Other points in Pittsburg and Youghiogheny.
" 5—West Virginia.
(1) Includes switching charges of B. & A. R. R. when not in excess of 30c.
Bituminous Coal ton—2,240 lbs.
Rates apply via Baltimore & Ohio Railroad.

Rates on pig iron,

Chester to New York	$1.40	per 2,240 lbs.
Chester to Baltimore	1.05	" " "
Chester to Philadelphia	.45	" " "

Rates on Manure,

Jersey City to Philadelphia (Gray's Ferry)	$1.00	per 2,000 lbs.
(52ndStreet)	.85	" " "

Rates on Sand, 30th & Market Sts., Philadelphia,
to Jersey City..... $1.05 per 2,000 lbs.
Elsewhere in Philadelphia to Jersey City... 1.90 " " "
Rates on Sugar,
Jersey City and Brooklyn to Philadelphia... $0.05 per 100 lbs.
New York to Philadelphia..... .08½ " " "

ITEM.—For the purpose of comparison and general information, all rail class rates as follows are submitted:

	1	*2*	*3*	*4*	*5*	*6*
New York to Philadelphia.....	22	18	15	12	10½	9½
New York to Baltimore.....	34	29	23	18	15	12
Philadelphia to Baltimore.....	23	20	18	12	10	9

3. FREIGHT RATES AND DELAWARE & RARITAN CANAL TOLLS ON MERCHANDISE BETWEEN PHILADELPHIA AND NEW YORK.

Commodity	All-Rail Rates per 100 lbs.	Canal Freight Rates per 100 lbs. ⊕	Canal Tolls per 100 lbs.
Machinery ..... (1)	22	9 (5)	1 8/10
Lumber ..... (4)	12	8 (6)	1 5½/10
Hay ..... (5)	10½	9 (5)	1 8/10
Roofing paper ..... (5)	10½	9 (5)	1 8/10
Hides, green ..... (5)	10½	9 (5)	1 8/10
Ore ..... (6)	9½	8 (6)	1 5½/10
Oilcake ..... (6)	9½	8 (6)	1 5½/10
Fertilizer ..... (6)	9½	8 (6)	1 5½/10
Cotton ..... (4)	12		
Sugar ..... (5)	10½	9 (5)	3 1/10
Manure ..... (3)	5	8 (6)	1 5½/10

⊕The freight rates include canal tolls.

4. FREIGHT RATES AND CHESAPEAKE & DELAWARE CANAL TOLLS ON MERCHANDISE BETWEEN PHILADELPHIA AND BALTIMORE.

Commodity	All-Rail Rates per 100 lbs.	Canal Freight Rates per 100 lbs. ⊕	Canal Tolls per 100 lbs.
Machinery ..... (1)	23	20	2 5/10
Lumber ..... (4)	12	10	3
Hay ..... (5)	10	9	1 3½/10
Roofing paper ..... (5)	10	9	1 1/10
Hides, green ..... (5)	10	9	
Ore ..... (6)	9	8	7/10
Oilcake ..... (6)	9	8	1 5/10
Fertilizers ..... (6)	9	8	
Cotton ..... (4)	12	10	
Sugar ..... (5)	10	9	2
Manure ..... (3)	18	16	7/10

⊕The freight rates include canal tolls.

APPENDIX "E"

PHILADELPHIA, March 10, 1911.

MR. WILFRED H. SCHOFF,
Secretary Committee on Traffic, &c.

DEAR SIR: In reference to your inquiry about the amount of tonnage likely to be carried over the canal connecting Philadelphia and New York, I would offer the following:

Figures have been made at different times in a conservative way by men interested in shipping as to tonnage and cost of same which have been based upon bulk cargoes, or, in other words, heavy commodities, taking the one commodity for a cargo. The shipping that I have been interested in on the Delaware River for the last twenty years has been the carrying of general merchandise, which takes in anything that can be shipped from a farm product to a manufactured article.

At the present time the farm products of New Jersey and Delaware during the heavy season, which is July and August, find their quick market in Philadelphia and Wilmington. There are carried by water during these two months hundreds of thousands of baskets of truck directly from the farm to the open market. My company alone will average two to three thousand baskets per day for about ten weeks, coming principally from the farms in and about Burlington, N. J., and Bristol, Pa. There are carried from the farms in the southern section in and about Gloucester County, N. J., in towed barges, from thirty to fifty thousand baskets daily, which come to Philadelphia market.

Besides this, the Gloucester Ferry, operating between Gloucester and Philadelphia, during a period of about ten weeks, carries about thirty thousand teams, each team with a carrying capacity averaging one hundred baskets, which are dumped into Philadelphia market. Also the Camden Ferries, all combined, probably carry a like number of teams loaded with light truck.

I give you these figures to show the vast amount of farm product that is being carried to the Philadelphia market from the New Jersey farms that would have a market in New York on a canal route where delivery could be made inside of ten hours. The farmer would be interested, as he would have two markets instead of one for the sale of his product. At the present time, if New York is paying higher for farm products than Philadelphia, the farmer has to pack his product into freight cars, which are hot in summer time and unfit for this kind of shipment, and send it through to New York, where it arrives in such condition as to bring less than it might if carried by team or boat to Philadelphia. But if he could ship it by open barges, where it would not be closely covered and heated, New York would become a competitive market with Philadelphia for all kinds of farm produce. It is a known fact that at the present time farm produce is shipped in cars from Southern New Jersey through to New York and Boston by rail. When there is not a solid train load it is held up at junction points and very often misses markets. Such delay in hot weather makes it unsalable, whereas if the canal were open and it could be gotten through within ten or twelve hours this loss would not occur.

In reference to manufactured products along the Delaware River, I wish to cite several cases that have arisen in the last year or two, one in particular—a shipment from the crockery plants at

Trenton was being made up for San Francisco, Cal., and Portland, Ore. This shipment consisting of about five car-loads, was taken on board the boat at Trenton, brought to Philadelphia and shipped by the Clipper Line from Philadelphia to San Francisco, which line took the shipment by all-water a long distance around Cape Horn. While the time of delivery was very much longer by this route than by rail across the continent, still the saving in freight and insurance amounted to $700, so that the consignee was willing to lose the time.

Again, a certain product manufactured at Trenton is being shipped daily to Chicago via the steamer route out of Trenton, all-water to Virginia and then via railroad to Chicago. This shipment has to be transferred, first via the company's team at Trenton, then aboard water lines from Trenton to Philadelphia, thence via outside steamer line from Philadelphia to Newport News, where it is loaded into freight cars and shipped by rail to Chicago. If this shipment were made all-rail out of Trenton, it would be loaded from the machine into the freight car, locked and sent directly through to destination, costing all-rail $1.00 per ton more than by the water and rail route. The water carrying distances are very small compared to the distance by rail, but still this shows the saving to the consignee that is made when water routes can be used. There is very little difference in time via all-rail or via water and rail. In solid car-loads, Trenton shipments will arrive in Chicago in about four days, while the water shipments will arrive in about six days; less than car-load shipments to the same place by water and rail will equal the all-rail in delivery. This is caused by the holding of the L. C. L. shipments to make up solid car-loads.

The advantage of the canal connecting New York and Philadelphia as to the saving of money to the manufacturer and to the consumer is an unknown quantity. No man to-day can figure the amount of money and actual saving of carrying of freight or the total worth or the time saved in transportation between the large cities that this water route will make. When the outside route is discontinued, the dangers of the sea cut out, it will mean that manufacturers will build their factories on the water-fronts, where they can take the advantage of both rail and water transportation.

The shipper often appears to be in the dark as to how to ship his goods to the best advantage. In a great many instances rates do not figure; it is a question of delivery. Where delivery can be made by water, the water lines carry freight that would otherwise go by express if they had to depend on rail, the delivery over the water lines being so much better than over the rail lines.

Merchandise is now being shipped from Trenton to Boston via water that is marked and ordered to be shipped out of Boston to points in Maine via express. The shipper finds he can save the difference between express rates and water freight rates and still get a quick delivery at destination. Trenton is thirty-five miles nearer New York than Philadelphia is, and yet shipments are being made to Philadelphia from plants at Trenton, to be re-shipped to New York via steamer, taking that long outside route, and still saving time over rail freight; whereas, if the canal were in operation, this same product would be delivered in New York inside of six or seven hours.

Instances can be quoted of all-water shipments between Trenton and Baltimore; for instance, floor tiling shipped from the factories at Morrisville, Pa., at 9 P. M. Saturday for the purpose of being placed on the floor of a hotel on Sunday (that being the only day of the week that work of this kind could be done). This shipment was placed aboard the steamer at Trenton on Saturday at 1 P. M., and was being laid on the floor of the hotel on the next day, Sunday, at 7 A. M. This is not a rare occurrence, but is being done almost

daily over the all-water line from Trenton to Philadelphia and from Philadelphia to Baltimore. Manufactured products are leaving Trenton for the South, leaving the factories as late as 3 and 4 o'clock in the afternoon, arriving at Norfolk and Newport News inside of forty-eight hours, ready for distribution at those points.

Respectfully yours,

H. F. STETSER.

APPENDIX "F"

Reports on the probable commercial influence of the proposed waterway upon Newark, N. J., Trenton, N. J., and Richmond, Va., have been received by this Committee from the Board of Trade of Newark, Chamber of Commerce of Trenton and Chamber of Commerce of Richmond. These reports have been forwarded to Col. W. M. Black, Corps of Engineers, U. S. A., New York City.

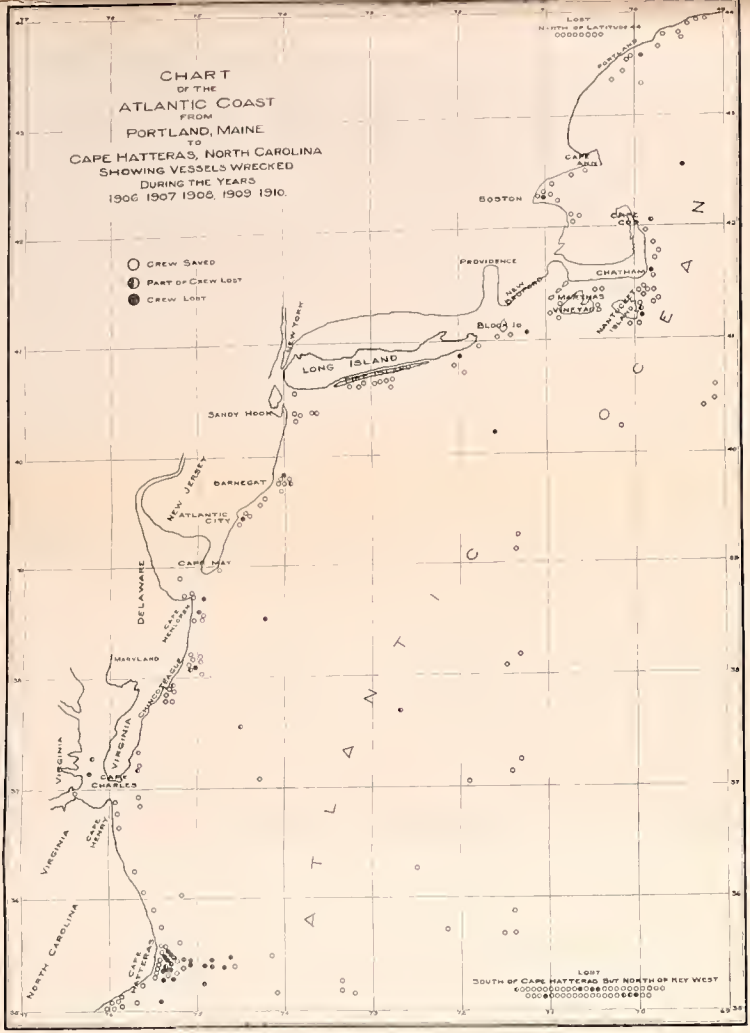


CHART
OF THE
ATLANTIC COAST
FROM
PORTLAND, MAINE
TO
CAPE HATTERAS, NORTH CAROLINA
SHOWING VESSELS WRECKED
DURING THE YEARS
1906 1907 1908, 1909 1910.
CREW SAVED
PART OF CREW LOST
CREW LOST
LOST
NORTH OF LATITUDE 44
PORTLAND
CAPE ANN
BOSTON
CAPE COD
PROVIDENCE
NEW BEDFORD
CHATHAM
MARTHAS VINEYARD
NANTUCKET ISLANDS
BLOCK ISLAND
NEW YORK
LONG ISLAND
FIRE ISLAND
SANDY HOOK
NEW JERSEY
BARNEGAT
ATLANTIC CITY
CAPE MAY
DELAWARE
MARYLAND
VIRGINIA
CHESAPEAKE
CAPE CHARLES
CAPE HENRY
VIRGINIA
NORTH CAROLINA
CAPE HATTERAS
ATLANTIC OCEAN
LOST
SOUTH OF CAPE HATTERAS BUT NORTH OF KEY WEST

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